THE BRICKBVILDER
AN ARCHITECTVRAL MONTHLY

VOLVME XXII FEBRVARY 1913 NVMBER 2

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LETTERPRESS

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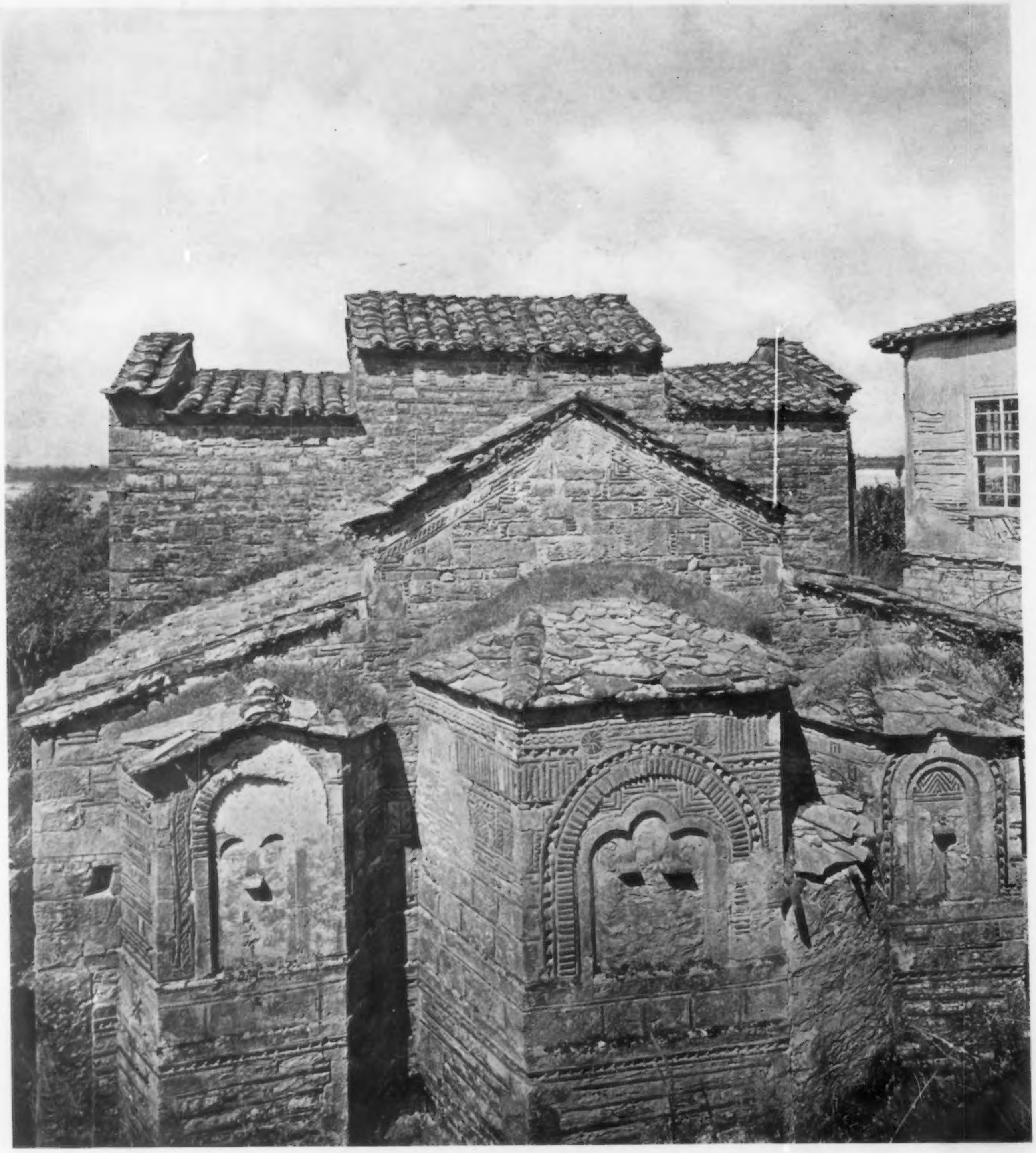


Photo by the Royal Prussian Photometric Institute.

CHURCH OF KATO PANHAGIA,
ARTA, EPIRUS, GREECE.

Stone and common brick, cut to shape for friezes and panels.

THE BRICKBVILDER

FEBRVARY, 1913

VOLVME XXII. NVMBER 2.

A House of Unusual Architectural Merit.

THE HITT RESIDENCE, WASHINGTON, D. C.

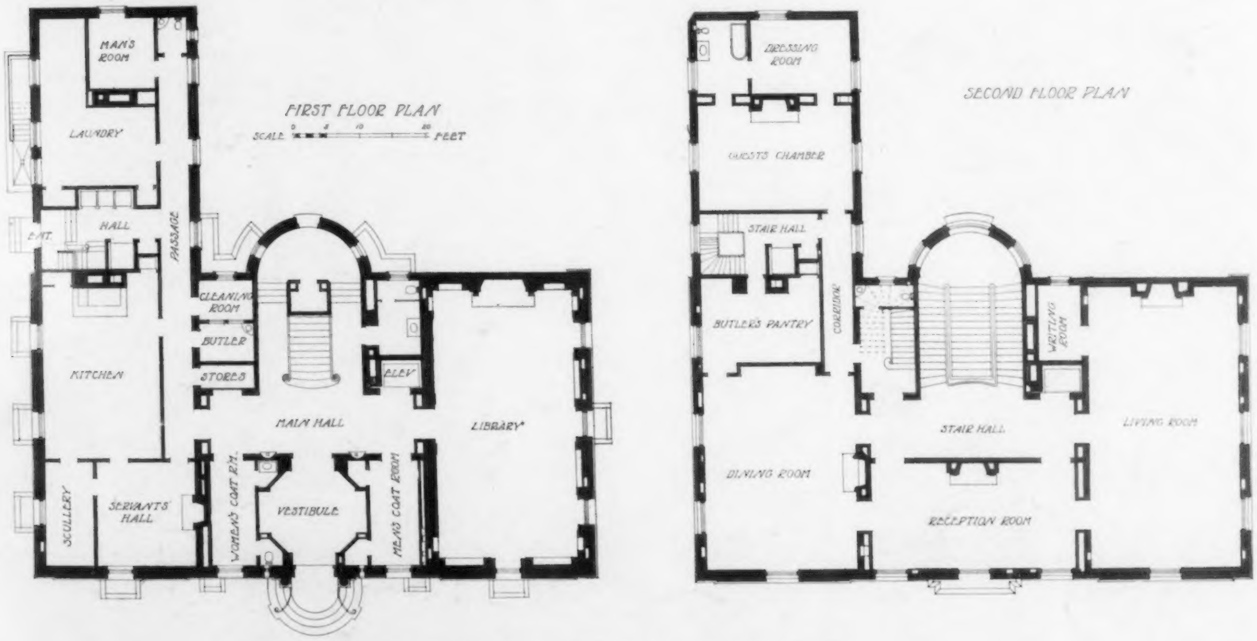
JOHN RUSSELL POPE, ARCHITECT.

SELECTED FOR TREATMENT BY WADDY B. WOOD, ARCHITECT.

IN writing an article to accompany the beautiful illustrations of the Hitt house in Washington, it does not seem necessary to go into any technical description of the plan, and style, and material, but rather to try, if possible, to point out the general reasons why it is so much more satisfying than most residences being designed to-day.

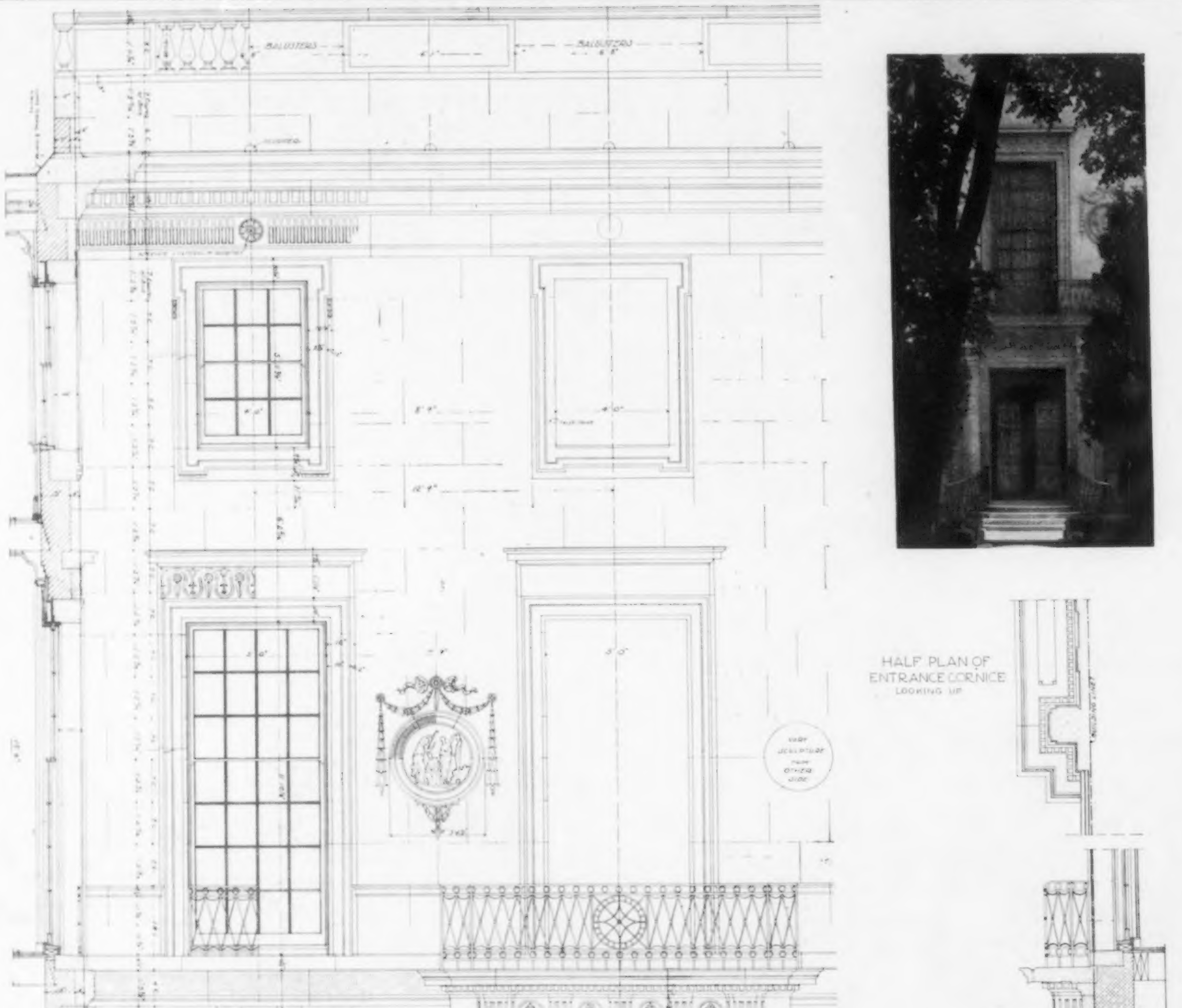
During a visit to Venice a few years ago, I was sitting on the plaza of St. Mark's with two architects, in view of the wonderful Renaissance Library by Sansovino, and the majestic old Doges Palace. I asked them which they thought was the better piece of architecture and they both said, "The Library." I then asked them which they would rather look at and they both answered, "The Doges Palace." I agreed with them at the time and then began to wonder why, and arrived at the one and only conclusion, which is, that the Doges Palace is the more charming because it is the more human, and being human, after all it is the better architecture. It may not be as satisfying structurally; it may not have its ornament arranged as we are taught to believe it should be; its composition maybe is peculiar; and yet we architects and laymen alike love to look at it. If this result is obtained, it is good architecture; and I have reached the conclusion that in criticism we should try to discover why the good is good.

The Hitt house is as good as the Doges Palace because it is human; and it takes a thinker and not a draftsman to make a new building human. Mr. Pope has the rare quality of being both, which I believe is rather unusual. The Doges Palace is human because of the countless ages of humanity that have left their impress on it as well as because the original designer constructed it to tell the story of his time. A new house has to be born with a voice, to speak to people as the Doges Palace does.



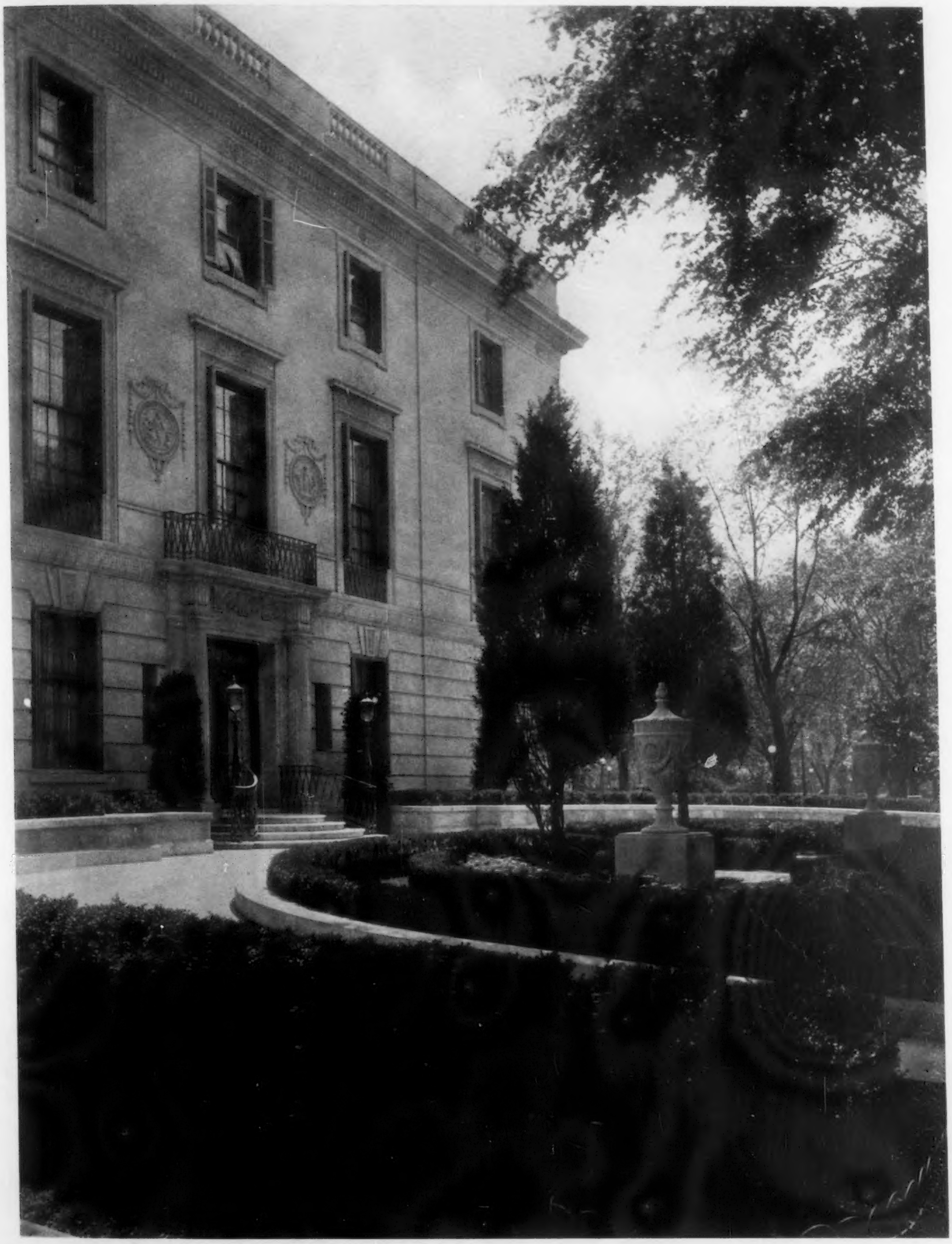
THE HITT RESIDENCE, WASHINGTON, D. C.
John Russell Pope, Architect.

The Hitt house is formal without being stiff, simple



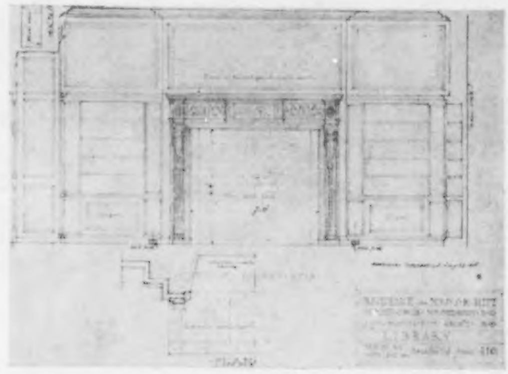
RESIDENCE OF MRS. S. R. HITT,
WASHINGTON, D. C.

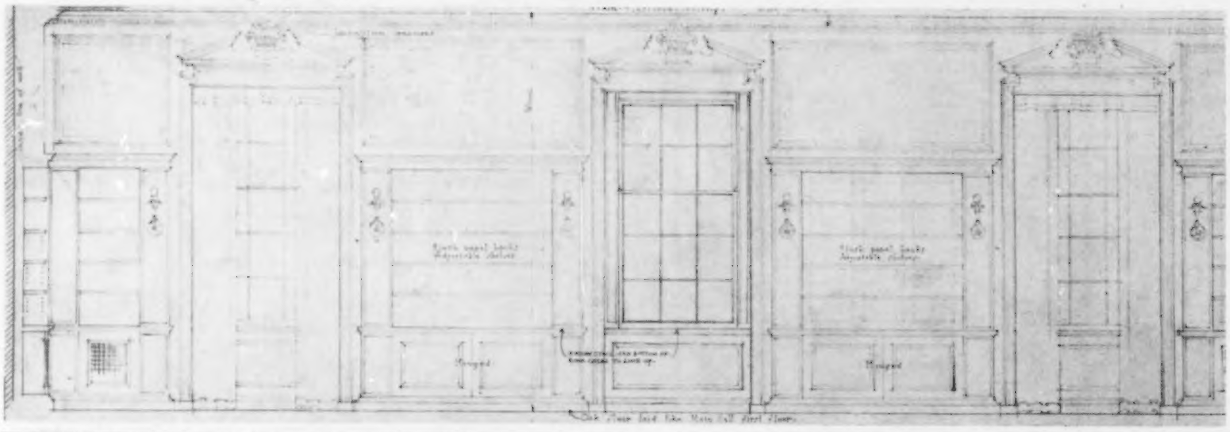
JOHN RUSSELL POPE, ARCHITECT.

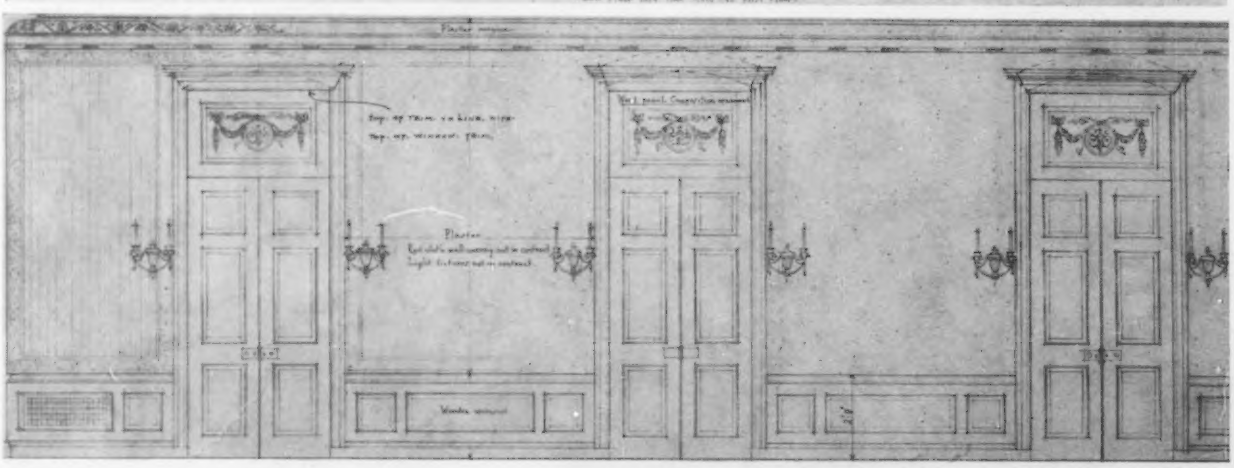


RESIDENCE OF MRS. S. R. HITT, WASHINGTON D.C.
JOHN RUSSELL POPE, ARCHITECT

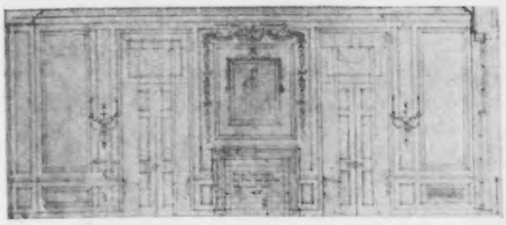
LIBRARY.



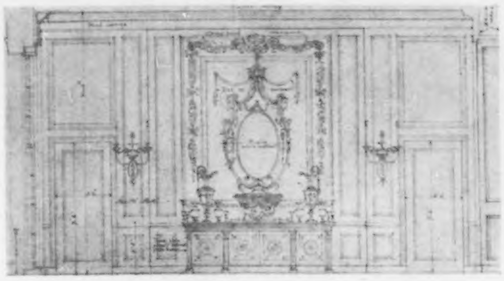




RESIDENCE OF MRS. S. R. HITT, WASHINGTON, D. C.
JOHN RUSSELL POPE, ARCHITECT.

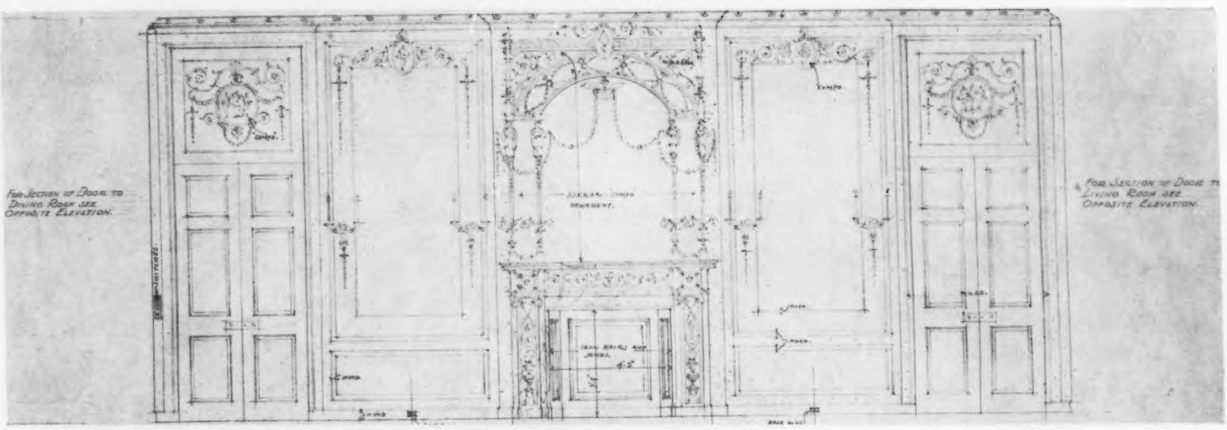


SCALE DETAIL OF DINING ROOM



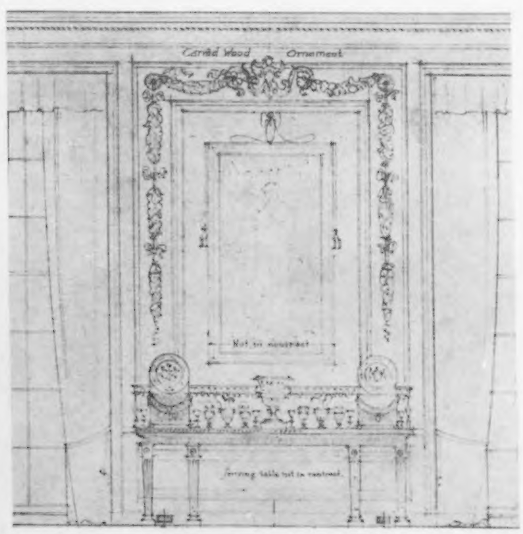
SCALE DETAIL OF DINING ROOM

DINING ROOM.



SCALE DETAIL OF RECEPTION ROOM.

RECEPTION ROOM.

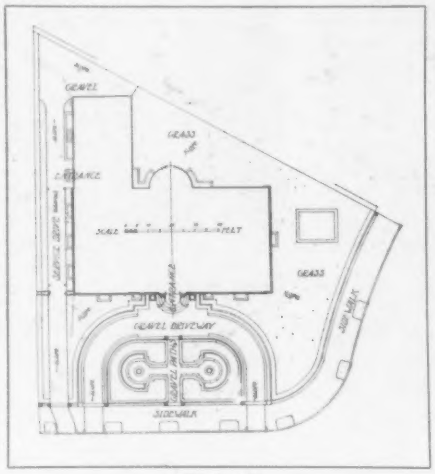


SCALE DETAIL OF DINING ROOM.

RESIDENCE OF MRS. S. R. HITT, WASHINGTON, D. C
JOHN RUSSELL POPE, ARCHITECT.

THE BRICKBUILDER.

without being plain, scholarly without being dry, and finally is very human. I believe that my readers will agree with me in the above statements from a glance at the illustrations which directly follow this page. When a man can accomplish a design which is at once formal, simple, scholarly, and human, it seems that his work is not only extremely rare, but so far above our average of American architecture as to warrant most careful study. It is by this means that we may lift our own work to a higher plane. There are many of us practising architecture that have his talent, and still more who have had his training; but I know of no architect now actively engaged in the practice of his profession who combines as he does both talent and training. His work is the result of this combination, and the Hitt house has an advantage over his other works in being done from a riper experience. It shows that he has arrived at his steady gait after feeling around in a more or less haphazard way in his earlier residence designs.



LOT PLAN.

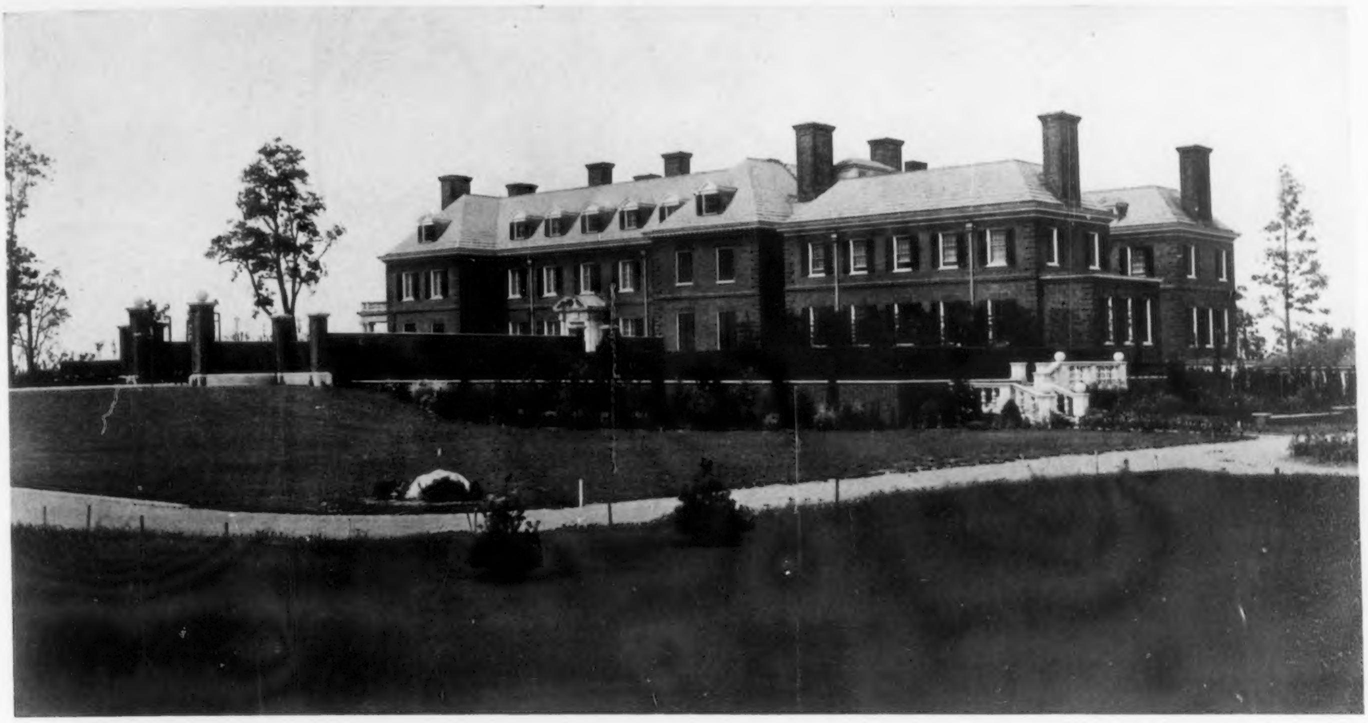
THE HITT RESIDENCE, WASHINGTON, D.C.
John Russell Pope, Architect.

On the return of a Washington draftsman from a trip to New York, I asked him for his impressions. He said, "Well, I will tell you. There are two distinct styles of architecture in that city." Knowing the many men of such different ideas and ideals there, and the straining after everything that has ever been done before which they are trying to do, I could not quite see how he could make such a statement. It seemed to me that if any city in the world had been cursed with a conglomeration, made possible by too much money and too many books, it was New York; so I asked with considerable interest what the two styles were. His answer was, "One well-known firm of architects and *the others*." A truer thing was never said, and his answer naturally makes one pause to wonder how he can get that individuality into his own work as does this well-known combination. Unless he is a genius the answer will never come. He can greatly help his work, though, after arriving at this stage and help greatly to make his country more beautiful, because he has an ideal above his reach. The Hitt house has those qualities which have made the work of that one firm classified above stand out above all others, although totally differently expressed — qualities which make the rest of our Washington residences look like "the others." This is done in a quiet, dignified way and in a way that makes one realize that it was far from the thought of the designer to strain after individuality. When a man tries to get individuality and fails, it is pitiful; all we see is the fall. Individuality is born in one, is God-given, and if properly directed can lead others on to better things.

A glance at the Hitt house façade shows individuality properly directed, and without an effort to do more than simply express the home of a cultivated American woman. That was the problem and it seems to me that Mr. Pope has solved it. Our architects have tried every conceivable style for this purpose and have failed in almost every case. I do not think these failures were entirely due to the styles adopted or the lack of education or taste of the designer, but to the fact that they were not conceived out of the mind of the designer for the purposes for which they were to be used. They were adopted from memory and training and lacked the vitality of something born into the world. A vital thing born with life or in one's mind, reared brutally or with due regard for precedent, is always interesting to any one whether architect or layman. This house has life and was reared with refinement; therefore, it not only is interesting, but something to love. I have found that people not trained in architecture are interested in it, which proves its life; and liked because of its refinement, which shows the blessing the designer enjoys of having had a thorough training. We can get the training, that we know; we do not know how large the spark or conception in us is, but one hope we all have, that it is there, however small. When this spark is fanned into a flame by ambition and controlled by training and work, then we can hope to do work as good and interesting as the Hitt house in Washington.

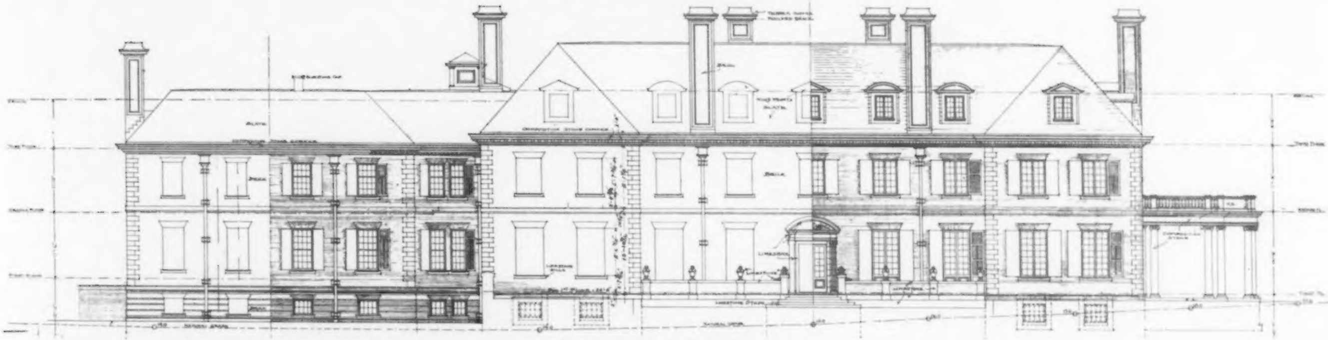
VESTIBULE — HITT HOUSE, WASHINGTON, D. C.

JOHN RUSSELL POPE, ARCHITECT.



HOUSE ON LONG ISLAND, NEW YORK
LA FARGE & MORRIS, ARCHITECTS

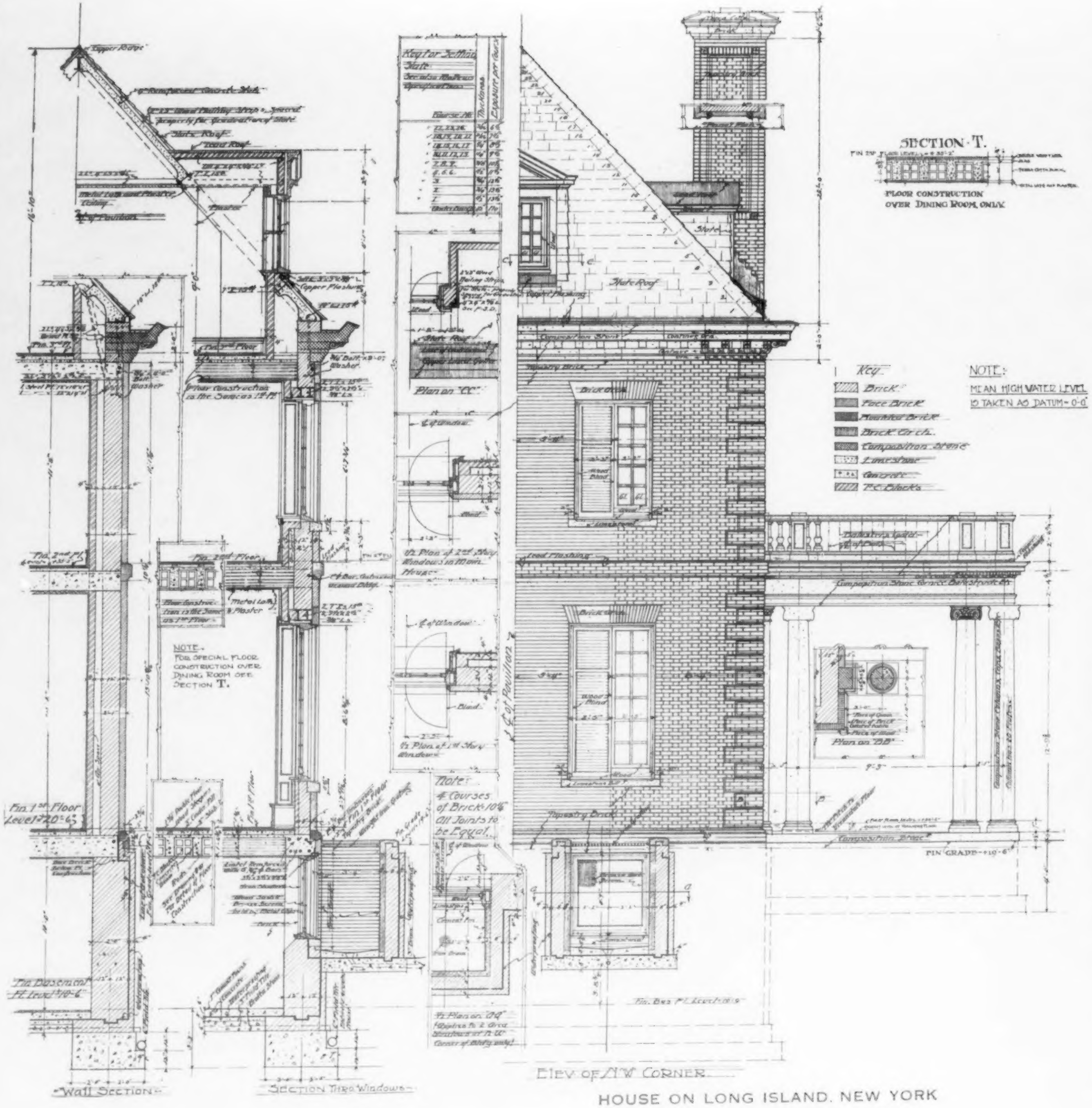
HOUSE ON LONG ISLAND, NEW YORK
LA FARGE & MORRIS, ARCHITECTS



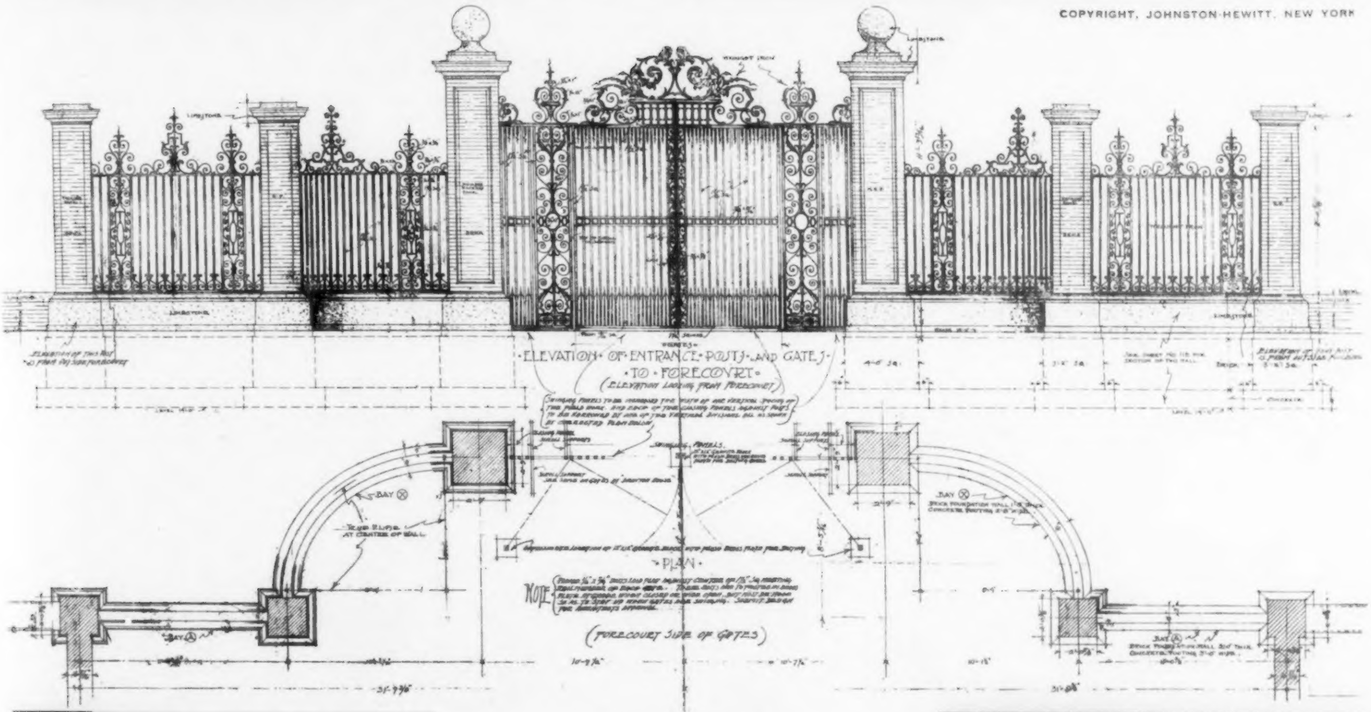
NORTH ELEVATION

NORTH DOORWAY DETAIL

SOUTH DOORWAY DETAIL



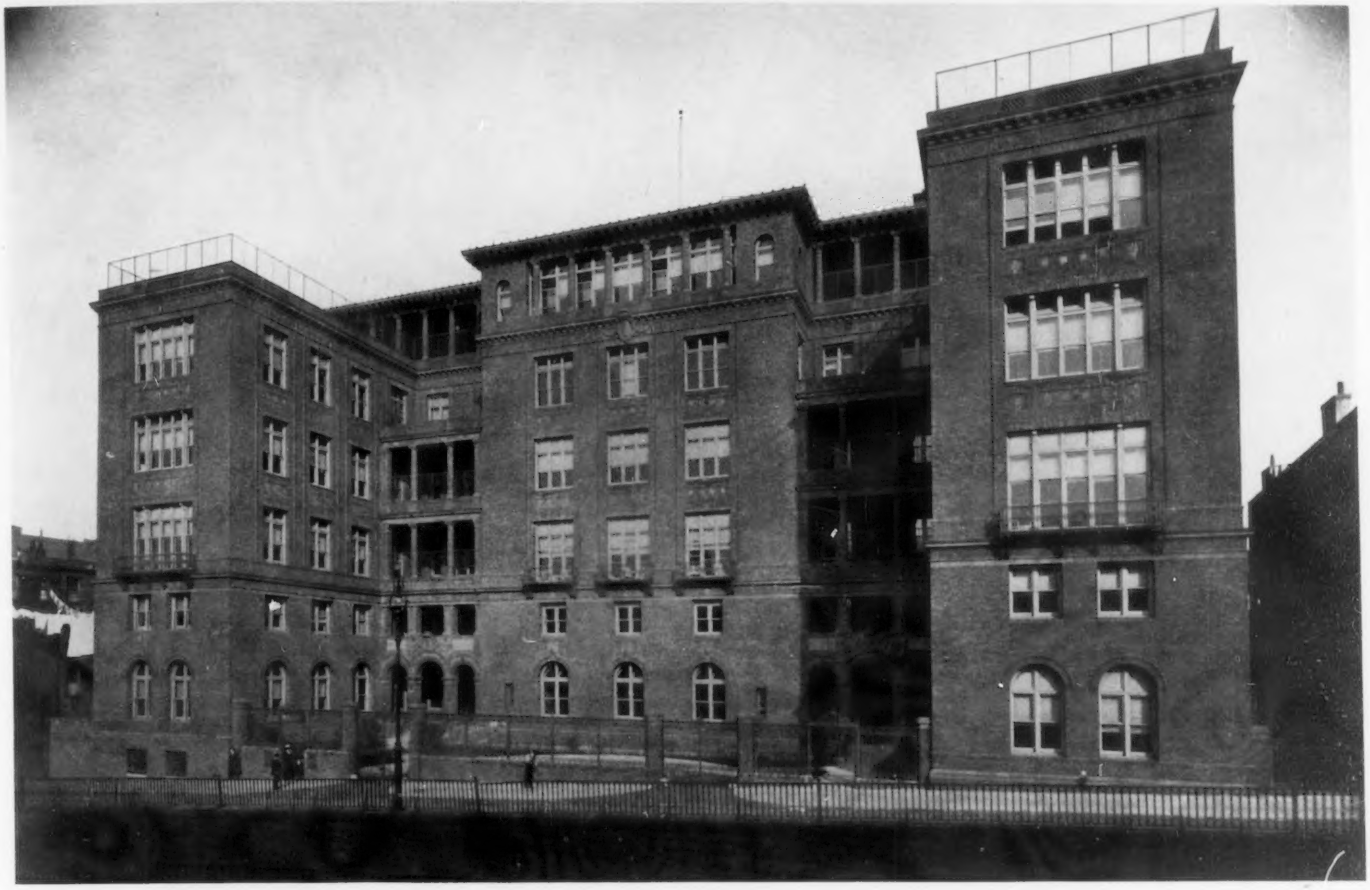
HOUSE ON LONG ISLAND, NEW YORK
LA FARGE & MORRIS, ARCHITECTS



ENTRANCE GATES

STABLE ON LONG ISLAND NEW YORK

LA FARGE & MORRIS ARCHITECTS



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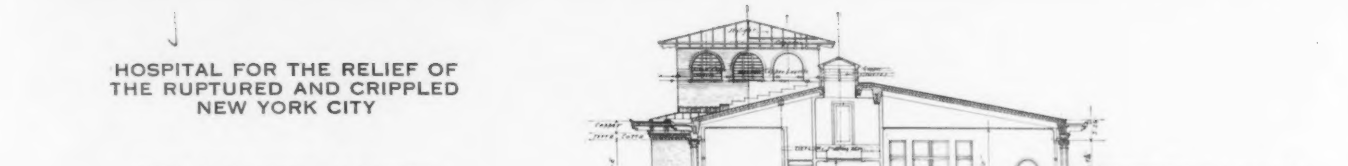
NEW YORK CITY

YORK AND SAWYER, ARCHITECTS



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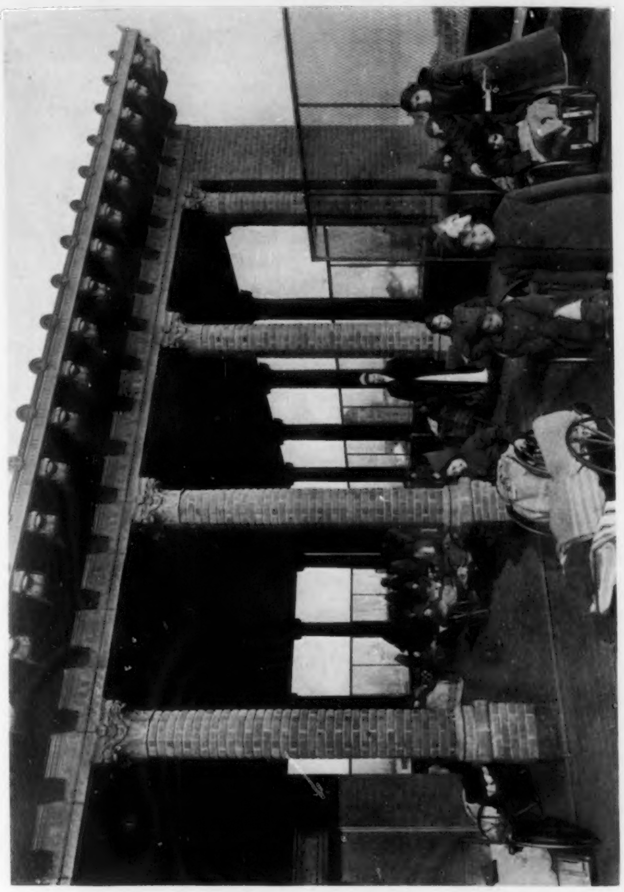

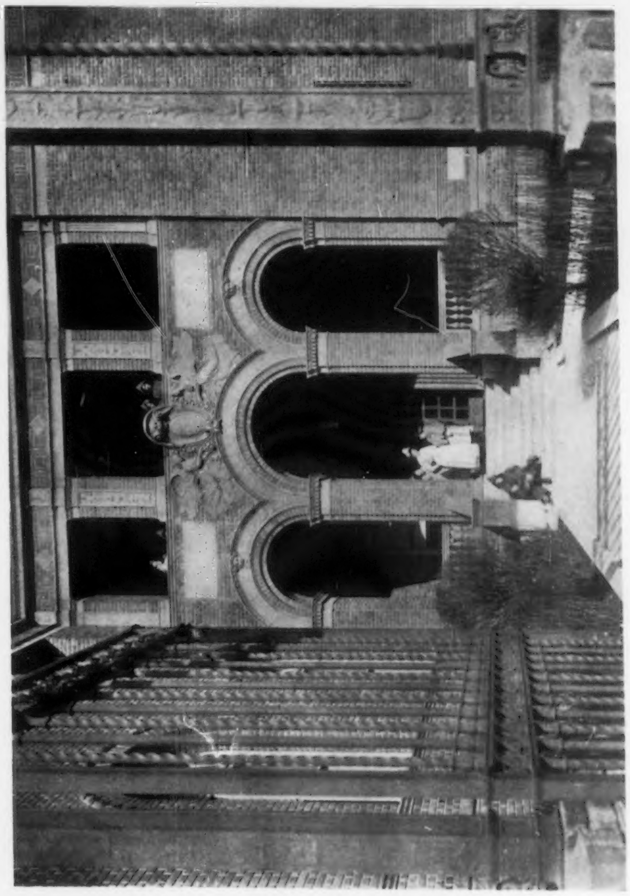

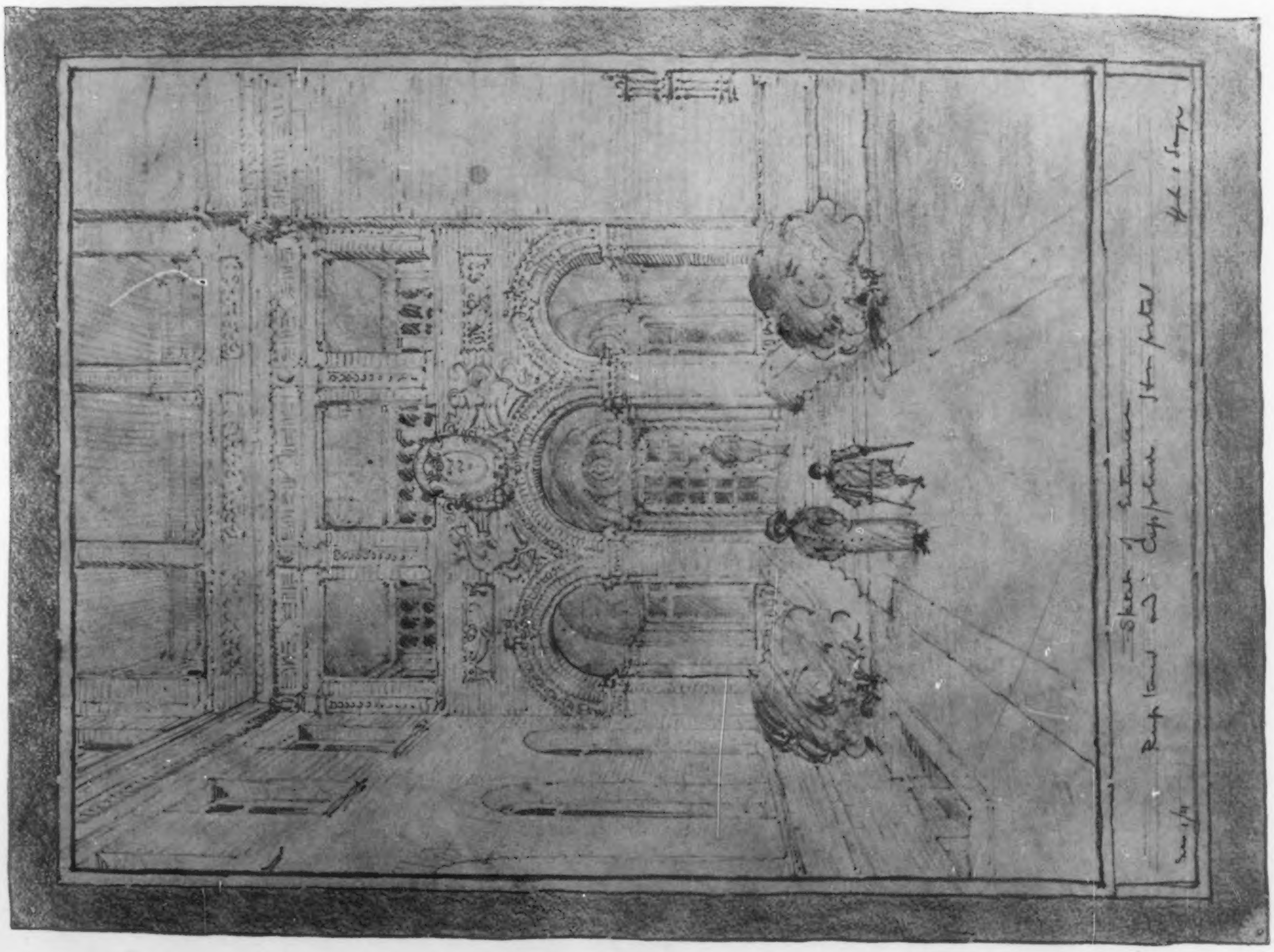

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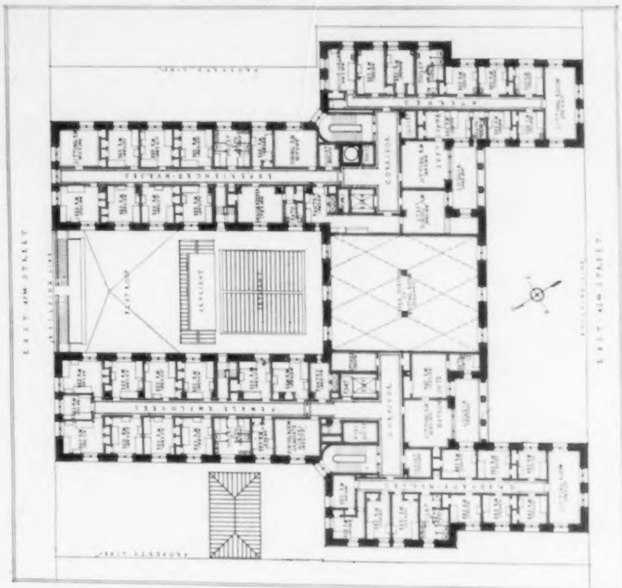
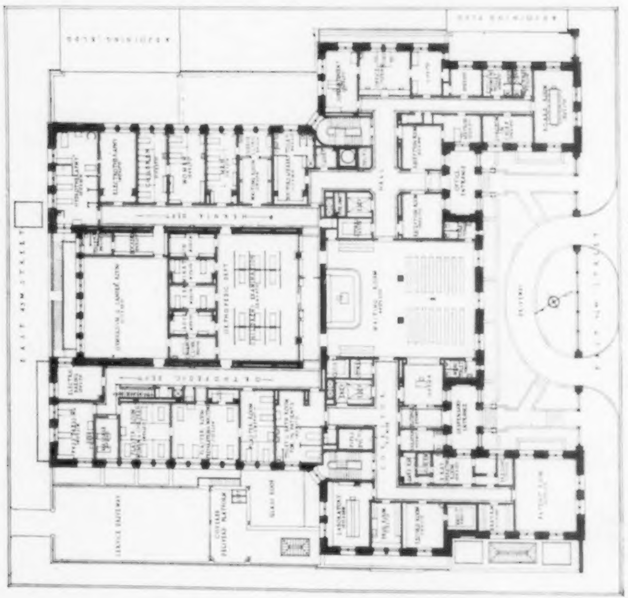
FIFTH FLOOR PLAN



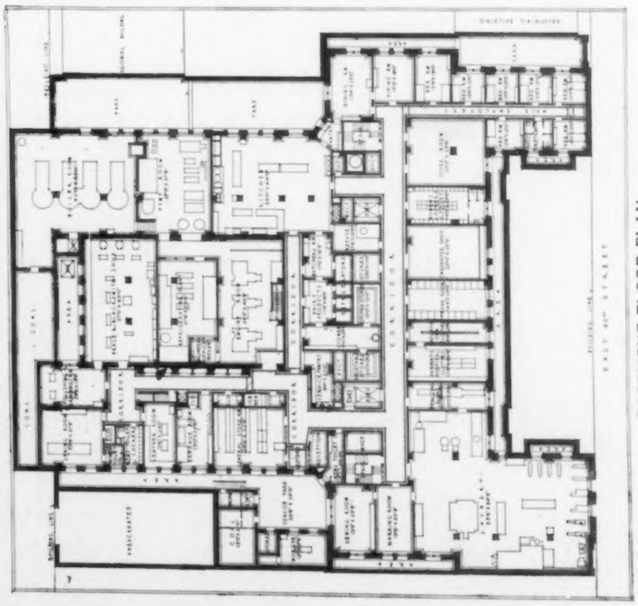
SECOND FLOOR PLAN

FOURTH FLOOR PLAN



FIRST FLOOR PLAN

THIRD FLOOR PLAN



BASEMENT FLOOR PLAN

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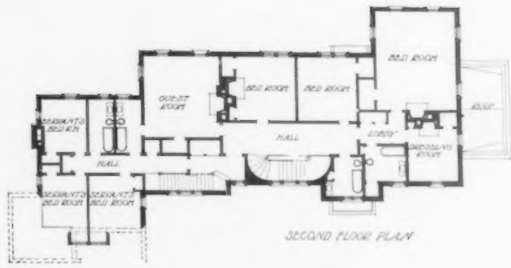
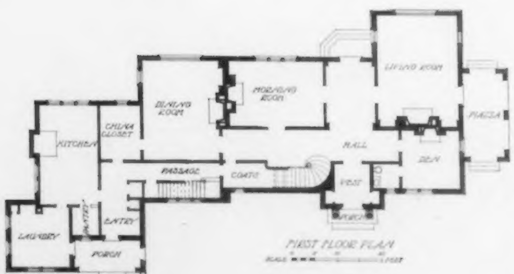
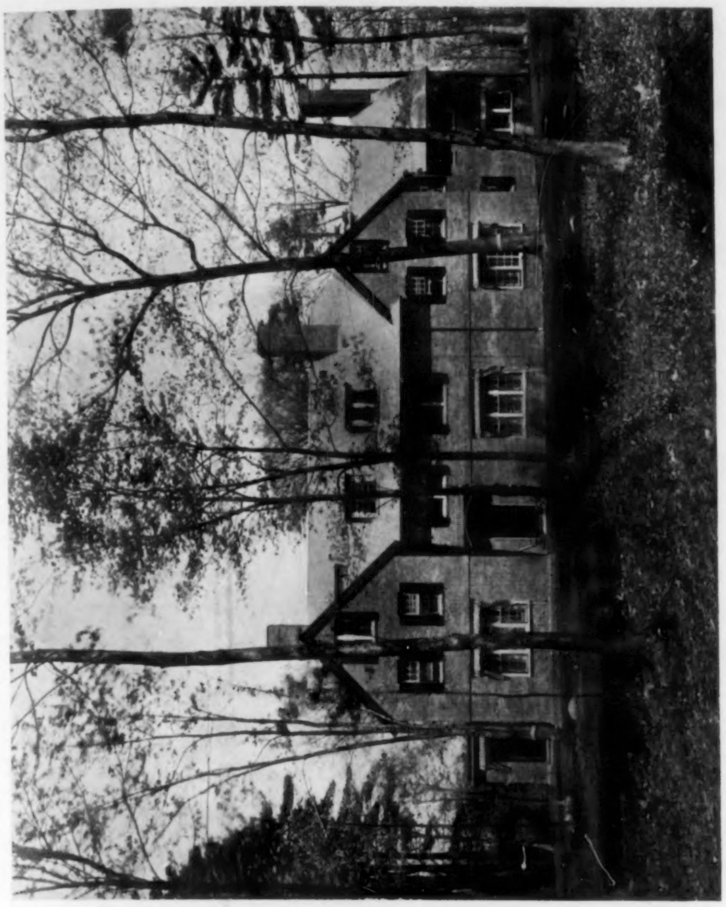
YORK AND SAWYER, ARCHITECTS

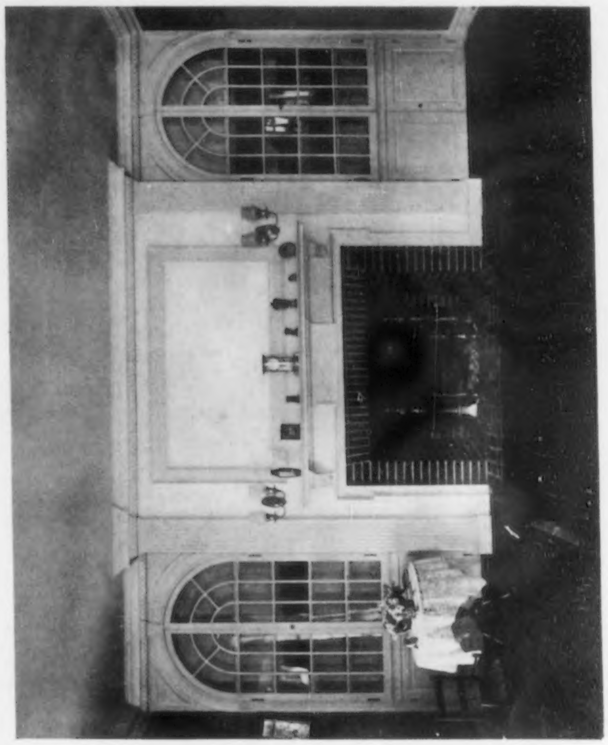


HOUSE AT MILTON, MASS.

JAMES S. LEE
ARCHITECT



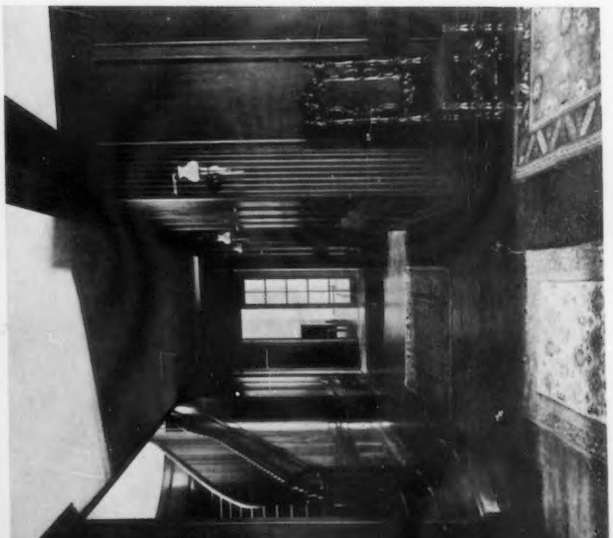




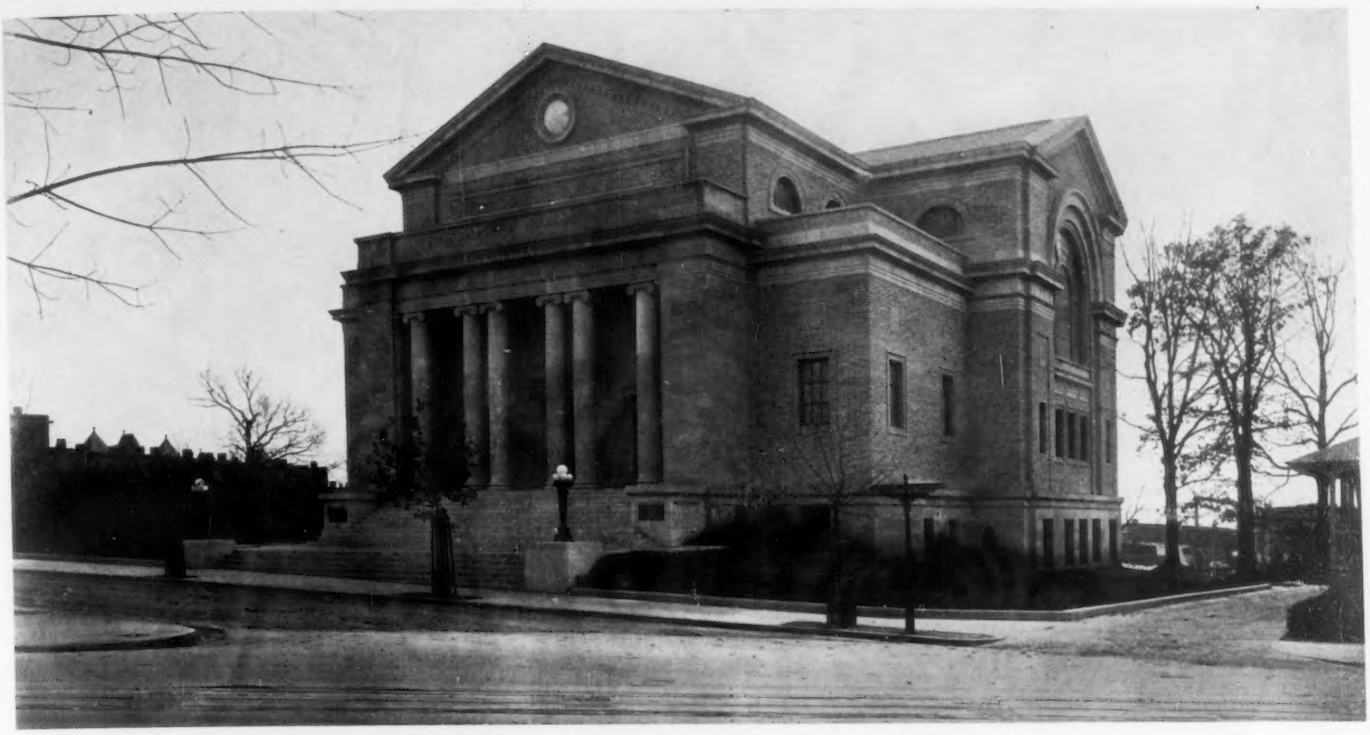
LIVING ROOM

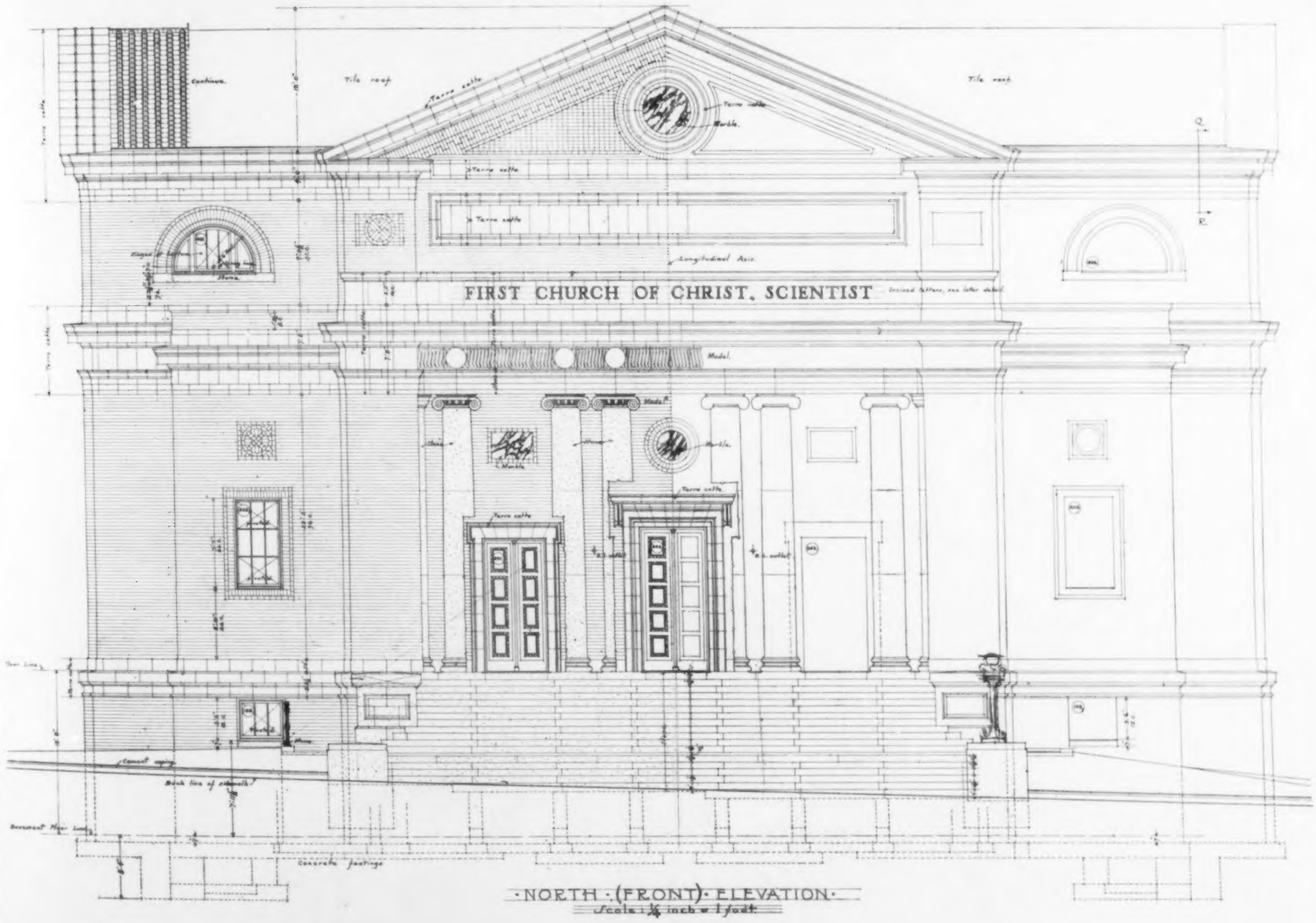
HOUSE AT MILTON, MASSACHUSETTS

JAMES S. LEE
ARCHITECT



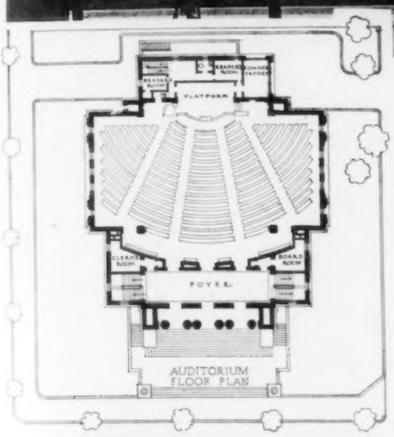
HALL





FIRST CHURCH OF CHRIST, SCIENTIST, WASHINGTON, D. C.

MARSH AND PETER & E. D. RYERSON, ASSOCIATE ARCHITECTS



FIRST CHURCH OF CHRIST, SCIENTIST
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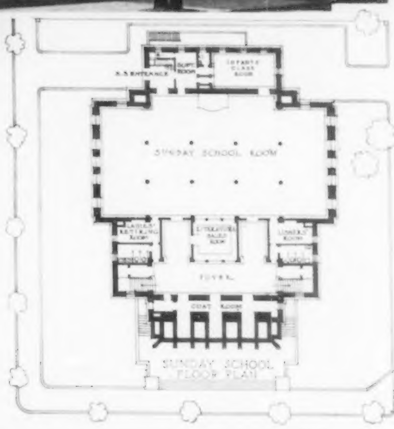
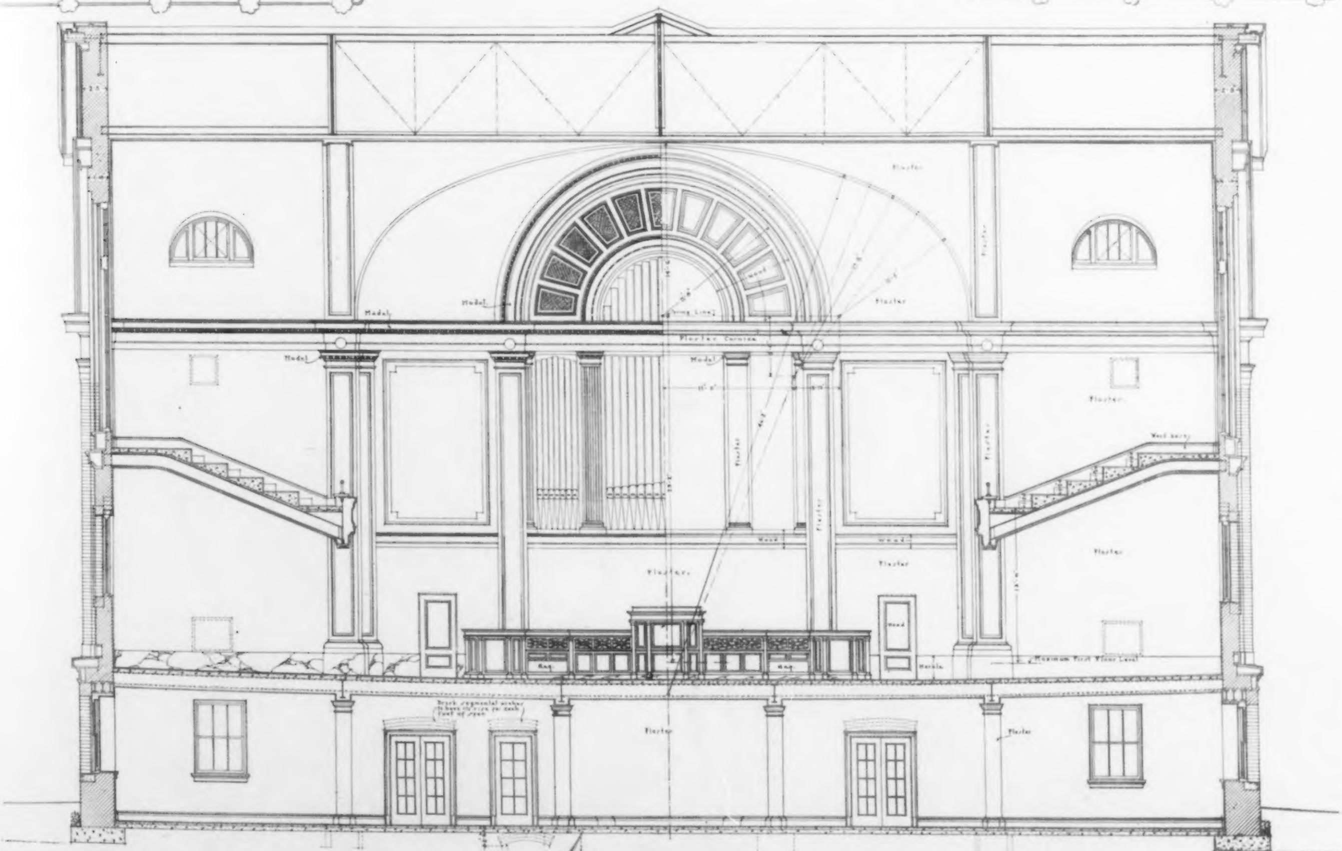
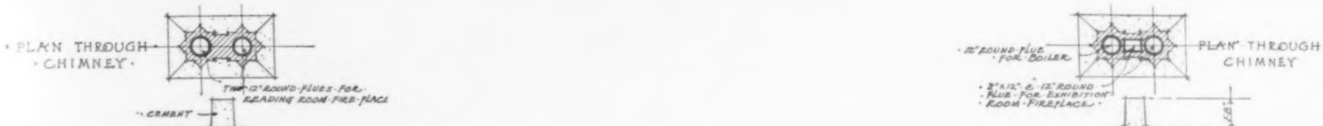




CROSS SECTION



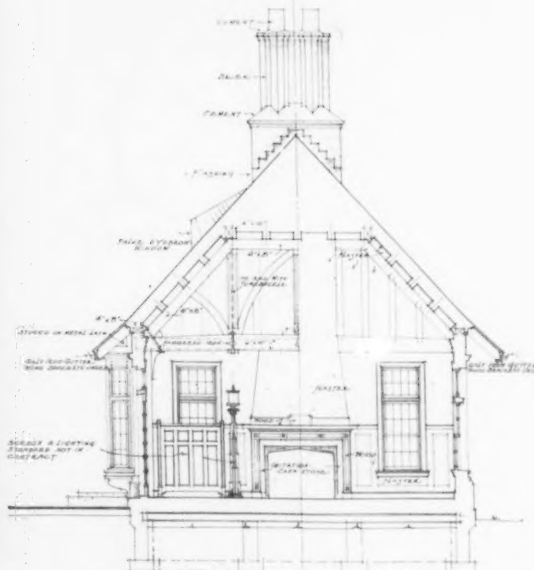
· FRONT · ELEVATION ·

EASTHAMPTON PUBLIC LIBRARY, EASTHAMPTON, L. I.
AYMAR EMBURY II, ARCHITECT

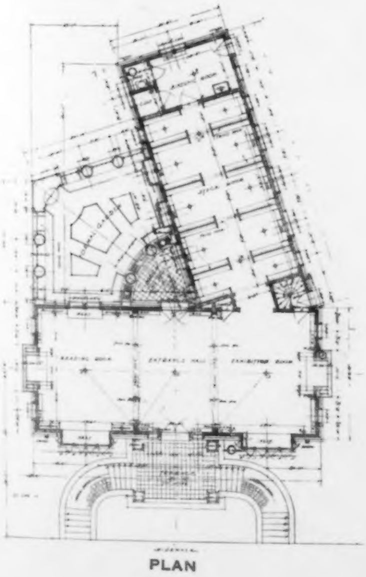
LOOKING INTO GARDEN

DETAIL OF REAR

INTERIOR



· HALF · SHOWING · TRUSS · · HALF · SHOWING · END · WALL ·



PLAN

EXTERIOR

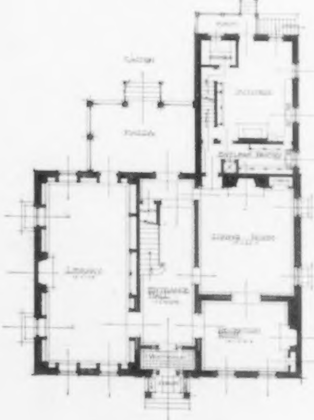
EASTHAMPTON PUBLIC LIBRARY, EASTHAMPTON, L. I.

AYMAR EMBURY II, ARCHITECT

HOUSE AT NEW HAVEN, CONN.

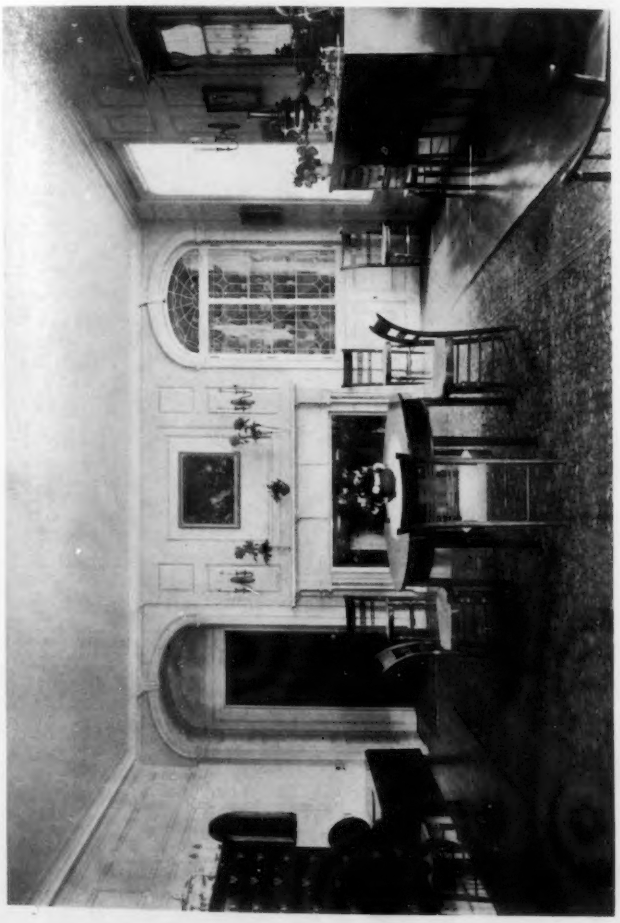
MURPHY & DANA
ARCHITECTS

SECOND FLOOR PLAN



FIRST FLOOR PLAN

RECEPTION ROOM



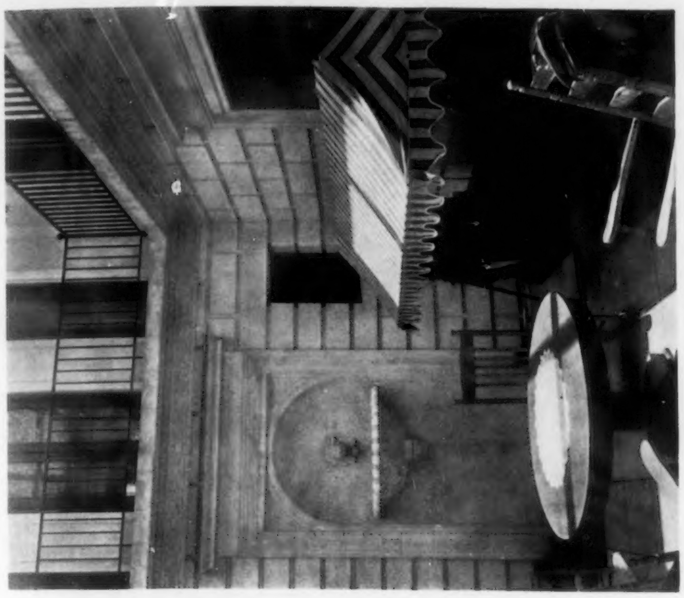
DINING ROOM

LIBRARY

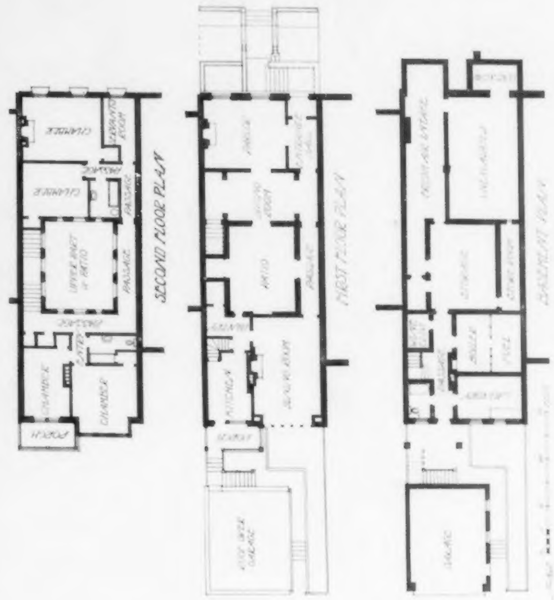
STAIR HALL

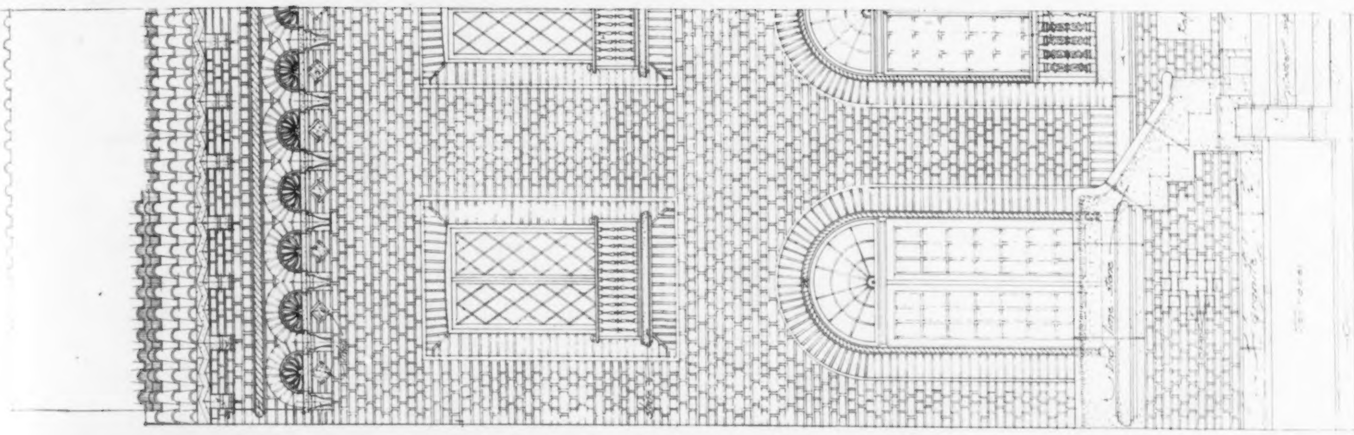
HOUSE AT NEW HAVEN, CONN.

MURPHY & DANA, ARCHITECTS



PATIO





HOUSE AT WASHINGTON, D. C.

WOOD, DONN & DEMING
ARCHITECTS

The Unit Power Plant for Isolated Buildings and Small Groups.

PART I. — PRELIMINARY CONSIDERATIONS.

BY CHARLES L. HUBBARD.

We start herewith a series of articles which will take up in a simple and concise form the isolated power plant as applied to single buildings of different types and to small groups. The matter has been treated especially from the architect's point of view, and data presented in such form that it may be used without extensive reading. Among the subjects considered are the uses of steam and power in buildings of various kinds; the determination of boiler, engine, pump, and dynamo capacities for different purposes, such as heating, ventilating, lighting, refrigeration, elevator service, etc. Apparatus of various kinds is discussed in detail, with special reference to the selection of equipment best adapted to the requirements of any particular case, taking into account comparative costs, both of installation and operation. The conditions under which it is advisable to install a power equipment in combination with the heating plant, with examples showing the saving which may be made with certain relations between power and heating requirements, will be studied. Details of design are considered to some extent, such as piping layouts for boiler and engine rooms, and underground conduits for steam and hot-water distribution to the various buildings of a group. The last article of the series treats of water supply by mechanical means, discussing briefly different sources of supply, reservoirs and tanks, pipe lines, and pumping machinery of various kinds, with a comparison of costs. — *The Editors*.

FOR the benefit of those who may be a little hazy upon certain terms and quantities employed in power and heating work, we will take up in a simple manner some of those in most common use.

Steam Boilers. Power and large heating boilers are usually rated on a *horse power* basis; one horse power being the capacity to evaporate 30 pounds of water per hour, from a feed-water temperature of 100 degrees, into steam at 70 pounds pressure. This quantity will vary somewhat with changes in the relation between temperature and pressure, but for the pressures commonly carried in this class of work, and where the feed-water is heated, the boiler may be safely proportioned on a basis of 30 pounds of steam per horse power per hour.

General Proportions. The commercial horse power of a boiler is commonly based upon its heating surface; horizontal fire-tube boilers being rated on a basis of 12 square feet of heating surface per horse power, and water-tube boilers on a basis of 10 square feet.

The required grate area depends upon the rates of combustion and evaporation. The rate of combustion meaning the pounds of coal burned per square foot of grate surface per hour, which, with a natural draft, will run from 12 to 15 pounds for anthracite and 15 to 18 pounds for bituminous. The rate of evaporation means the pounds of steam generated per pound of coal. With the best makes of power boilers, well cared for and skilfully fired, this will run from 8 to 10 pounds, although the lower figure probably comes nearer the actual result in the average power plant of small size. The grate surface in any particular case is found by the following formula,

$$S = \frac{H.P. \times 34.5}{E \times C}, \text{ in which,}$$

S = grate area in square feet.
E = rate of evaporation.
C = rate of combustion.
H.P. = horse power of boiler.

Table I, computed by the above method, gives the square feet of grate area per horse power for different rates of evaporation and combustion.

TABLE I.

Rate of Evaporation.	Rate of Combustion. 12 lbs.	15 lbs.	20 lbs.
10 lbs.	.28	.23	.17
9 ,,	.32	.25	.19
8 ,,	.36	.29	.22

The approximate coal consumption per boiler horse power per hour may be found by multiplying the square feet of heating surface per horse power by 0.3, which gives $12 \times 0.3 = 3.6$ pounds for horizontal fire-tube boilers, and $10 \times 0.3 = 3$ pounds for water-tube boilers. In computing the total boiler horse power for any building, first determine the maximum weight of steam required per hour for all purposes, and divide the result by 30.

Chimneys. The successful operation of a boiler plant is largely dependent upon the action of the chimney, unless mechanical draft is employed. The latter method is not usually required in plants of small size, although used quite extensively under certain conditions in larger ones. The draft of a chimney is dependent upon the height, while the power, or capacity for carrying off the waste gases, varies with the sectional area of the flue. The required draft varies largely with the kind of fuel used, because the finer the grade of coal the greater the pressure necessary to force the air through it. The following heights have been found to give good results in plants of moderate size, and produce sufficient draft to force the boilers from twenty to thirty per cent above their rating. Free burning bituminous coal, 75 feet; anthracite of medium and large sizes, 100 feet; slow-burning bituminous, 120 feet; anthracite pea coal, 130 feet; anthracite buckwheat coal, 150 feet.

Table II gives the diameter and height of flue for different boiler horse powers. To use the table, first select the proper height for the grade of fuel to be used, and then from the table find the required diameter for the given horse power of boilers to be provided for.

TABLE II.

Diameter of Flue.	Height of Chimney and Boiler Horse Power. 60′	70′	80′	90′	100′	125′	150′
24″	54	58	62	----	----	----	----
27″	72	78	83	----	----	----	----
30″	92	100	107	113	----	----	----
33″	115	125	133	141	----	----	----
36″	141	152	161	173	182	----	----
39″	----	183	196	208	219	----	----
42″	----	216	231	245	258	271	----
48″	----	----	311	330	348	365	389
54″	----	----	----	427	449	472	503
60″	----	----	----	536	565	593	632
66″	----	----	----	----	694	728	776
72″	----	----	----	----	835	876	934

Steam Engines. The power of a steam engine is also rated in horse power, but on an entirely different basis. In this case one horse power means the capacity of doing work at the rate of 33,000 foot pounds per minute. The indicated horse power (I.H.P.) means the total power developed, and includes that required for overcoming the friction of the engine itself, while the brake or delivered horse power (D.H.P.) means the power delivered by the engine and available for driving other machinery. This,

at full load, will vary from eighty to ninety per cent of the I.H.P. depending upon the type and size of engine. For machines of medium size, the average of these or eighty-five per cent may be used. The ratio of the delivered horse power to the indicated horse power, $\left(\frac{\text{D.H.P.}}{\text{I.H.P.}}\right)$ is called the mechanical efficiency, and enters into computations involving the power of engines for different purposes.

The *water-rate* of an engine is the weight of steam required per I.H.P. per hour for driving it. This quantity varies greatly in different types of engines, and also in the same type when operating under different conditions. Table III gives average water-rates of engines of medium size and first-class make, when running at or near full load.

TABLE III.

Type of Engine.	Pounds of Steam per I.H.P per Hour.
Simple High Speed	32
Simple Medium Speed	30
Simple Corliss	28
Compound High Speed	26
Compound Medium Speed	25
Compound Corliss	24

The above figures are for non-condensing engines, that is, where the exhaust steam is turned outboard to the atmosphere or into a heating system operating under a slight pressure. When a condenser is employed in connection with an engine, the water-rate, under ordinary conditions, is reduced to about eighty per cent of the above.

Steam Turbines. The principle of the steam turbine is such that its capacity cannot be expressed in indicated horse power, and the brake or delivered horse power is used instead. This makes it necessary, when comparing the power or water-rate of engines and turbines, to reduce them both to brake horse power. The steam economy of a turbine depends largely upon a low vacuum at the exhaust end, and hence, to get the best results, must be run condensing. For this reason they have not in the past been used to any great extent in small sizes and on non-condensing work because of the excessive amount of steam required as compared with a reciprocating engine. Recent developments along this line have produced small and medium sized non-condensing turbines which compare very favorably in steam economy with simple high-speed engines operating under the same conditions. When run condensing, the advantage in economy is in favor of the turbine, especially on a variable load.

Gasolene Engines. Steam engines and turbines are more commonly used for generating power, in the class of work under consideration, because the exhaust can be used for heating purposes during the winter. On the other hand, there are instances where power is simply wanted during the summer season, as in the case of estates occupied for only a portion of the year. In plants of this kind an outfit employing gasolene or oil engines will often be preferable on account of its simplicity and lower first cost. The amount of fuel for operating an engine of this type will vary somewhat, according to size and make, but for the average machine it may be taken as about 0.8 pound per brake horse power.

Electric Power. Both direct and alternating currents are used for power and lighting, but the former, at 125 or 250 volts, is usually to be preferred for the unit plant where motors are to be supplied. With a direct current it is possible to use direct-connected slow-speed motors for the driving of ventilating fans, which is a matter of considerable importance in certain types of buildings. Furthermore, the speed regulation of motors driven by a direct current is more satisfactory. Electricity is measured commercially by the *kilowatt hour;* a kilowatt (Kw.) being equal to 1,000 watts. A watt is the unit of measurement, being equal to the product of 1 volt x 1 ampere.

For example, a current of 4 amperes, flowing under a voltage of 250, will have a capacity of $4 \times 250 = 1{,}000$ watts, or 1 Kw., and a kilowatt hour is the electrical energy delivered per hour by a current of this capacity.

Electric generators or dynamos are rated in kilowatts, and have an efficiency at full load of about ninety per cent for those of medium size.

This means that for every 100 horse power of mechanical energy expended in driving a generator, 90 horse power of *electrical* energy will be given out. The indicated horse power of an engine for driving a generator is given by the formula, $\text{I.H.P.} = \frac{\text{Kw.} \times 1{,}000}{746 \times A \times B}$, in which

I.H.P. = indicated horse power of engine.
Kw. = capacity of generator in kilowatts.
A = efficiency of engine.
B = efficiency of generator.

For generators ranging from 25 Kw. to 250 Kw., the I.H.P. of engine may be taken as 1.7 times the Kw. rating of the generator, with sufficient accuracy.

Efficiency Losses. When a steam engine is used for driving a generator, and the electrical energy from this again transformed into mechanical energy by means of a motor, there is a loss in each transformation. In other words, there is one loss in the engine, another in the dynamo, and another in the motor, all of which must be taken into account when computing the sizes of motor, generator, engine, and boiler, to do a given amount of work. The efficiencies of small motors, such as are used for fan work, will average about eighty per cent, while larger ones for elevator and similar service have an efficiency of about ninety per cent at full load.

Assuming, then, efficiencies of eighty, ninety, and eighty-five per cent for motor, generator, and engine respectively, it will require $\frac{1}{.80 \times .90 \times .85} = 1.63$ indicated horse power at the engine for each horse power delivered by the motor; or conversely, the total efficiency of the three machines is $.80 \times .90 \times .85 = .612$, or practically sixty per cent.

Electric Lighting. There are two common methods of determining the sizes of generator and engine for electric lighting. One is to prepare a list of all the lamps, together with the current in amperes required by each. The total current, multiplied by the voltage of the system, will give the watts required, and this in turn divided by 1,000 will give the Kw. rating of the generator.

The second method takes into account the candle power and efficiency, the latter being expressed in watts per candle power. In this case the candle power of each lamp is multiplied by its efficiency and the total of these products divided by 1,000 to obtain the Kw. rating of the generator. Having determined the capacity of the gen-

erator, the I.H.P. of the engine for driving it is obtained by the methods already given.

It is often desirable in preliminary work to approximate the power required for lighting before the number and type of lamps have been worked out. In cases of this kind the necessary current may be based upon the floor space to be lighted, using the following assumptions. For general lighting with incandescent lamps, as in the case of offices, halls, etc., from 1.0 to 1.2 watts will be required per square foot of floor space, while drafting rooms and other places requiring a more brilliant illumination will take twice that amount. For arc lights with opal globes, the following may be used for rooms used for different purposes.

TABLE IV.

Use of Room.	Watts per Sq. Ft. of Floor Space.
Clothing Store	1.30
Hall	1.00
Drafting Room	2.00
Machine Shop	0.75
Weave Room	1.20

Elevators. The elevators employed in stores, hotels, office buildings, etc., are of two general kinds, hydraulic and electric; the latter being subdivided into the drum, duplex, and screw types. The power required for running an elevator varies a good deal with the type, speed, and general conditions under which it is operated.

In the figures given below, average loads, speeds, and efficiencies have been assumed for the various types; also, the different methods of counterbalancing the cars have been taken into account, together with the additional power required for accelerating the load when first starting. The usual custom has been followed, where definite information is not at hand, of computing the power required for running all of the cars at one time under full load and taking 0.7 of the result.

Under these conditions, hydraulic elevators require from 0.6 to 0.7 *delivered* horse power per square foot of floor space in the cars. Elevators of this type are driven by direct-acting steam pumps, and in order to determine the necessary boiler power for this purpose, the water-rate of the pump must be known.

For average conditions, this is given in Table V for different types of pumps.

TABLE V.

Type of Pump.	Pounds of Steam per Delivered Horse Power per Hour.
Simple, Non-condensing	120
Compound, Non-condensing	65
Triple, Non-condensing	40
High Duty, Non-condensing	30

Electric elevators of the drum and duplex types require from 0.4 to 0.5 delivered horse power per square foot of floor space, and the screw type about 1 horse power. As electric elevators are motor driven, the efficiencies of the various machines through which the energy passes must be taken into account as already described. That is, the I.H.P. of the engine driving the generator must be approximately 1.6 times the power delivered to the car.

Refrigeration. There are two methods of refrigeration commonly employed, known as the *compression* and *absorption* methods. As the latter does not require mechanical power for its operation, only the former will be considered in the present article. The capacity of a refrigerating plant is commonly expressed in "tons of refrigeration" or "ice-melting effect." That is, a 5-ton machine will produce the same cooling effect in 24 hours as the melting of 5 tons of ice. The ammonia compressor is commonly driven by a direct-connected steam engine or electric motor, although small machines are often belted to a convenient counter-shaft, if one is available. Under average conditions, 1 I.H.P. at the steam cylinder of the compressor will produce about 0.75 ton of refrigeration per 24 hours. For example — a 5-ton machine will require $5 \div 0.75 = 6.6$ I.H.P. at the steam cylinder for driving it. If the compressor is motor driven, the efficiencies of motor and generator must be taken into account, which will call for approximately 2 I.H.P. per ton of refrigeration at the engine driving the generator. The above figures apply to the form of refrigeration commonly employed in hotels, etc., for cold storage and not to the actual manufacture of ice.

Heating. The simplest method of determining the quantity of steam required for heating is to base it upon the amount of radiating surface to be supplied. This, for ordinary conditions, may be taken from the following table, which gives the pounds of steam condensed per square foot of radiation per hour for different forms of surface.

TABLE VI.

Type of Radiating Surface.	Pounds of Steam Required per Sq. Ft. of Surface per Hr.
Direct Steam	0.3
Indirect Steam	0.6
Direct Hot Water*	0.2
Indirect Hot Water*	0.4

*In forced hot-water systems where the water is heated by exhaust steam.

Ventilation. In case the building, or a portion of it, is supplied with fresh air by means of a fan independently of the heating system, it is customary to assume a temperature rise from zero to 70 degrees.

Under these conditions it will take 1.5 pounds of steam for each 1,000 cubic feet of air supplied, which includes that used in generating the power for driving the fan.

Hot-Water Heating. In some buildings, like hotels, hospitals, etc., the item of hot-water heating for toilet and laundry purposes is an important one.

This will require approximately 1 pound of steam for each gallon of water heated from 50 to 170 degrees, which may be taken as average conditions during the winter season.

Utilizing Exhaust Steam. If the exhaust steam from the engines and pumps is used for heating and ventilating purposes, as should always be done under ordinary conditions, this should be deducted from the total quantity of steam required for all purposes, when computing the boiler horse power. The available heat in the exhaust will depend somewhat upon the type of engine used, initial pressure, etc., but it will be safe to consider eighty per cent, at least, of the steam delivered to the engines available in the exhaust for heating purposes.

Summary.

Boilers. One boiler horse power (B.H.P.) is required for each 30 pounds of steam per hour. Average coal consumption, 3.6 pounds per B.H.P. for fire-tube boilers, and 3 pounds for water-tube boilers.

For grate area, see Table I.

Engines. Average efficiency eighty-five per cent.

Indicated horse power (I.H.P) equals approximately 1.2 x delivered horse power (D.H.P.).

For water-rate, see Table II.

The use of a condenser reduces the water-rate twenty per cent.

Steam Turbines. Water-rate approximately the same as reciprocating engines working under same conditions.

Oil Engines. About 0.8 pounds of oil required per delivered horse power under average conditions.

Electric Power. Commercially measured by the kilowatt hour.

Average efficiency of generators, ninety per cent. Indicated horse power of engine for driving generator is equal to 1.7 times kilowatt rating of generator.

Efficiency Losses. The loss in power between that generated by a steam engine and that delivered by a motor is approximately forty per cent, or 1.6 indicated horse power must be provided at the engine for each horse power delivered by the motor.

Electric Lighting. Total current, times voltage, divided by 1,000, will give Kw. rating of generator, or candle power, times efficiency, divided by 1,000.

Approximate method — allow 1 to 1.2 watts per square foot of floor space for ordinary lighting; also see Table III.

Elevators. For hydraulic, 0.6 to 0.7 delivered horse power per square foot of floor space; see also Table IV.

For electric, 0.4 to 0.5 delivered horse power per square foot of floor space for drum and duplex types, and 1 horse power for the screw type. See "Efficiency Losses."

Refrigeration. For steam compressors, provide 1.3 indicated horse power per ton of refrigeration, and for motor-driven machines, 2 indicated horse power at main engine per ton of refrigeration.

Heating. Steam consumption based on square feet of radiation.

See Table V.

Ventilation. Provide 1.5 pounds of steam for each 1,000 cubic feet of air supplied in zero weather.

Hot-Water Heating. Provide 1 pound of steam for each gallon of water to be heated from 50 to 170 degrees.

Utilizing Exhaust Steam. About eighty per cent of the steam supplied to engines and pumps is available in the exhaust for heating purposes.

Order of Computation. (1) Reduce the horse power to be delivered by all motors to electrical horse power (E.H.P.), by formula (*a*).

$$(a)\ \text{E.H.P.} = \frac{\text{D.H.P.}}{0.8}$$

(2) Reduce electrical horse power to kilowatts, by formula (*b*).

$$(b)\ \text{Kw.} = \text{E.H.P.} \times 0.746,$$

and to this add kilowatts required for lighting, to find size of generator.

(3) Find indicated horse power of generator engine by formula (*c*).

$$(c)\ \text{I.H.P.} = \text{Kw.} \times 1.7$$

(4) Find maximum weight of steam required in pounds per hour, deduct such part of the "available exhaust" as may be used for heating purposes, and divide the remainder by 30 to find the boiler horse power.

$$(d)\ \text{B.H.P.} = \frac{\text{Pounds of steam per hour}}{30}$$

Example. A building is to contain 12,000 square feet of direct steam radiation, 4,000 square feet of indirect, and is to be provided with 300,000 cubic feet of fresh air per hour.

Hot-water supply, 300 gallons per hour. The building is also to contain the following equipment:

One 5-ton refrigerating machine of the steam compressor type. Three hydraulic elevators, each having a floor area of 30 square feet. One duplex electric elevator with a floor area of 12 square feet. Miscellaneous motors amounting to 10 horse power.

The electric lighting service will call for a total of 400 amperes at 125 volts.

The problem is to compute the capacity of generator, the indicated horse power of the engine for driving it, and the boiler horse power. Computations to be made on the assumption that the entire plant will be in operation at one time, and that the available exhaust steam will be used for heating purposes.

Starting with the electric elevator we have $12 \times 0.5 = 6$ D.H.P. required, which added to the miscellaneous motor output amounts to $6 + 10 = 16$ D.H.P. This reduced to E.H.P. by formula (*a*) gives E.H.P. $= \frac{16}{0.8} = 20$, which reduced to Kw. by formula (*b*) calls for $20 \times 0.746 = 14.9$ or 15 Kw. capacity in the generator.

The generator capacity for lighting amounts to $\frac{400 \times 125}{1,000} = 50$ Kw., making a total of $15 + 50 = 65$ Kw.

Power of driving engine, by formula (*c*), is $65 \times 1.7 = 111$ I.H.P.

The next step is to compute the steam required for power purposes, and determine the available exhaust.

Assuming a simple high-speed engine for the generator, the steam requirement will amount to $111 \times 32 = 3,552$ pounds per hour. The power for the hydraulic elevators will amount to $3 \times 30 \times 0.7 = 63$ D.H.P.

If compound non-condensing pumps are used it will require $63 \times 65 = 4,095$ pounds of steam per hour.

A small slow-speed simple engine for driving the refrigerating machine will have a water-rate of about 40 pounds per I.H.P., which, in the present case, amounts to $5 \times 1.3 \times 40 = 260$ pounds of steam per hour.

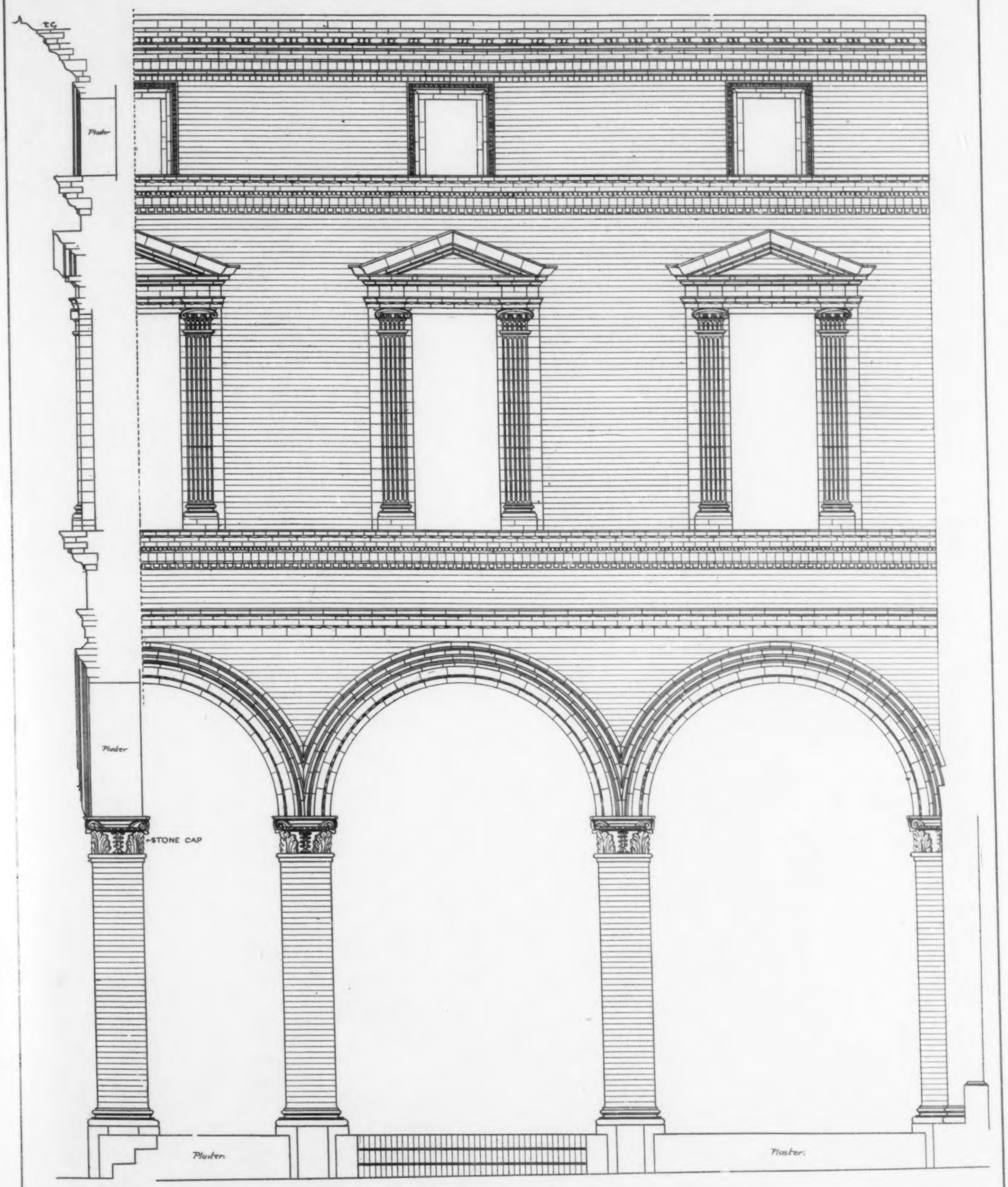
This gives a total of $3,552 + 4,095 + 260 = 7,907$ pounds of steam per hour for power purposes, of which $7,907 \times .80 = 6,325$ pounds are available in the exhaust for heating purposes.

The steam required in pounds per hour for heating purposes is as follows:

Direct radiation,	12,000 ×	.3 =	3,600
Indirect radiation,	4,000 ×	.6 =	2,400
Ventilation,	300 ×	1.5 =	450
Water heating,	300 ×	1 =	300
Total,			6,750 pounds per hour

The available exhaust amounts to 6,325 pounds, so that only $6,750 - 6,325 = 425$ pounds of live steam per hour are required for heating. This calls for a boiler capacity of $\frac{7,907 + 425}{30} = 278$ H.P.

In the above example it has been assumed that all of the apparatus would be in use at its full capacity at the same time. A following article will take up cases varying from this condition.

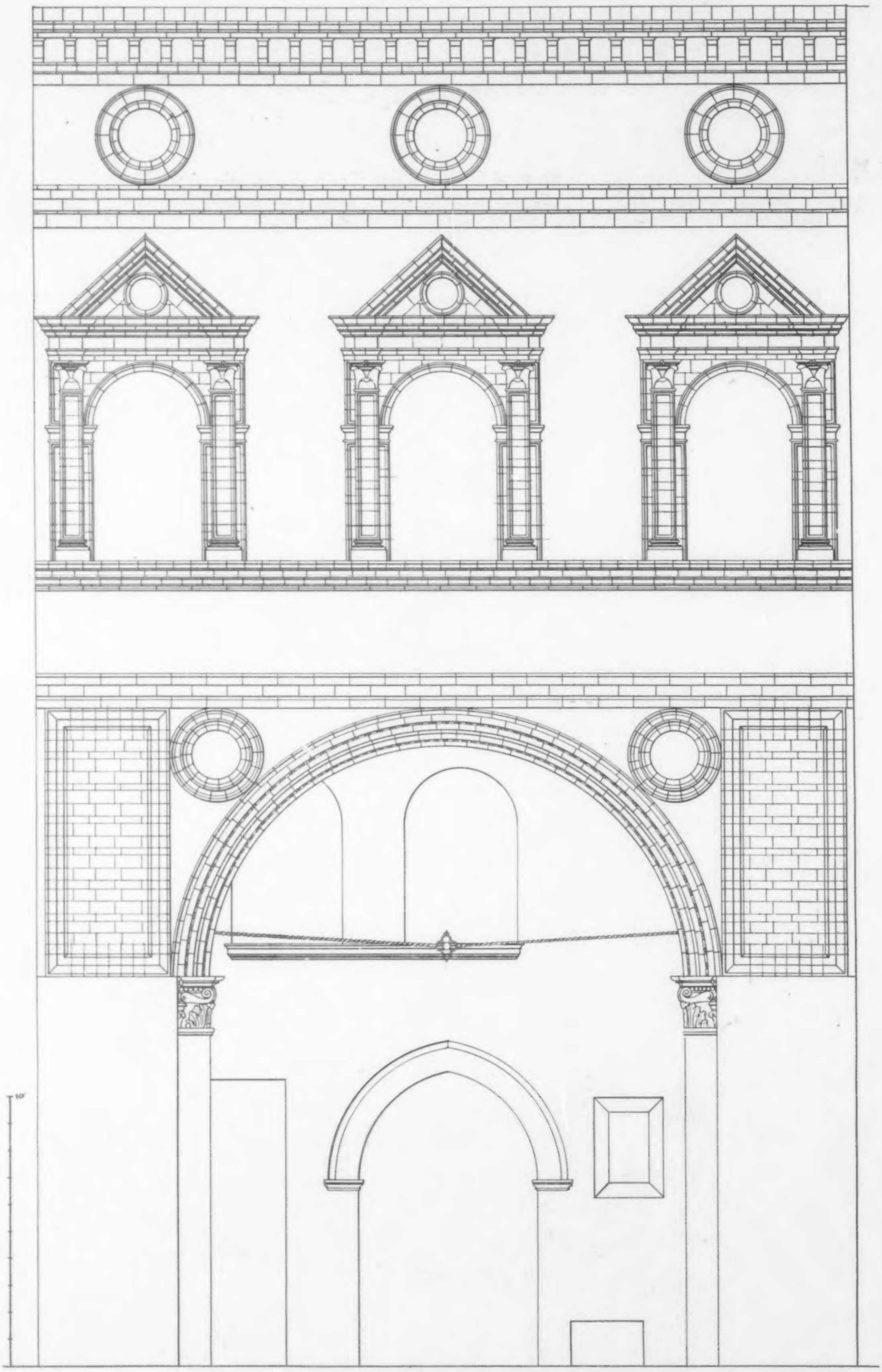


SECTION ·ELEVATION

HOVSE IN VIA SAN VITALE·
BOLOGNA·ITALY·

SCALE

MEASURED DRAWINGS—ITALIAN SERIES.
WILL S. ALDRICH, DEL



PALAZZO TACCONI. BOLOGNA. ITALY.

MEASURED DRAWINGS—ITALIAN SERIES.

WILL S. ALDRICH, DEL.

MORRISTOWN SCHOOL, MORRISTOWN, N. J. Boring & Tilton, Architects.
A closely connected group composed as an "Open Court," according to the best classic traditions.

Recent American Group-Plans.

V. — PREPARATORY SCHOOLS AND INSTITUTIONS.

BY ALFRED MORTON GITHENS.

PASSING from the colleges to the schools, one finds no abrupt division; the smaller colleges and the larger schools seem quite the same thing in problems to be solved and in types of solution adopted. The following Analytical Table classifies the usual requirements:

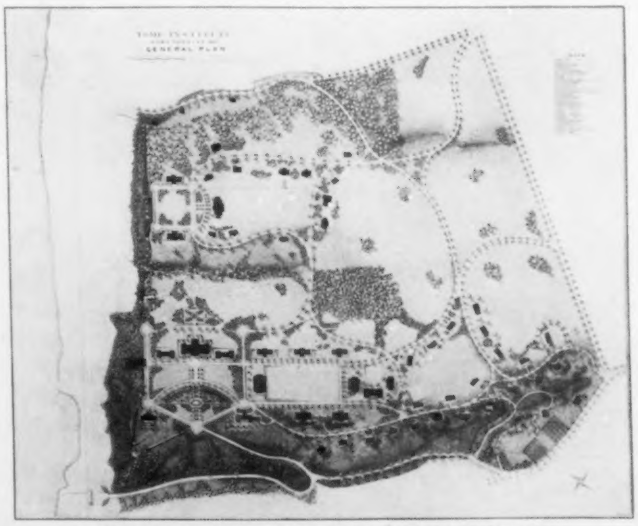
SCHOOL OR COLLEGE	Instruction	Administration. Chapel. Auditorium. Library. Class Rooms. Laboratories.
	Residence	Dormitories. Refectory. Infirmary. Students' Clubs. Masters' Houses.
	Athletics	Gymnasium. Playing Fields.

There is usually also a power plant. Universities may add various professional schools; any of the divisions may be missing; in the Boston Normal and Latin School there is neither Athletic nor Residential divisions.

As to architectural style, of course the great monumental college groups find no counterpart among the schools. The Tome Institute in Maryland is one of the most formal and nearest a college in expression. It is being built from a comprehensive plan; a winding drive leads up to a garden, treated with the formality of a Court of Honour; the Instructional buildings surround it; the dormitories are around a practice-field and the primary department surrounds a play ground; the masters' houses edge the hill to the east.

Phillips Exeter, Phillips Andover, and St. Paul's, Concord, are counterparts among the larger schools of that hap-hazard college which grew up in the latter half of the eighteen hundreds. Exeter has one great lesson in its concentrated Instruction and Residence and the enormous space given the third great division, Athletics; surely as needful to a boy as anything else and too often left for the strong lad while the under-developed, needing it the most, avoids it. This condition Exeter attempts to improve. The catalogue states that "during the first two months of the fall term all members of the school are urged to engage in football or other sports appropriate to the season. The prescribed gymnasium work begins early in November and continues to the end of the winter term. Thereafter all students are required to report regularly at the Playing Fields four times a week, where they participate in baseball or track sports, or tennis, or golf, as the individual may prefer."

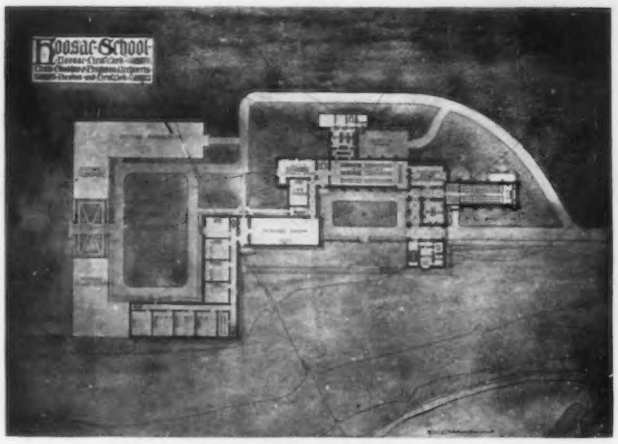
Perhaps Bénard was not very far wrong when he placed the gymnasium and its field in the most important position of his great plan for the University of California. The trend is toward a fuller development of this branch in schools for both sexes, as proved by the prominence of the gymnasium and terraced tennis-courts in the Dow School for girls, the parade of the New York Military Academy, and the tennis, football, and baseball fields in the proposed plan for St. George's, Newport. Like the Tome Institute, this is one of the few larger school groups being built from a definite plan; but whereas the Tome is designed according to the monumental traditions of the École des Beaux Arts as applied to the generally accepted American ideals, St.



TOME INSTITUTE, PORT DEPOSIT, MARYLAND.
Boring & Tilton, Chas. W. Leavitt, Jr., Architects.
On edge of plateau overlooking Susquehanna River; interesting subdivision by groups; usual arrangement of Scholastic buildings in Entrance group, Dormitories more remote; compare State Normal School, Troy, Ala.

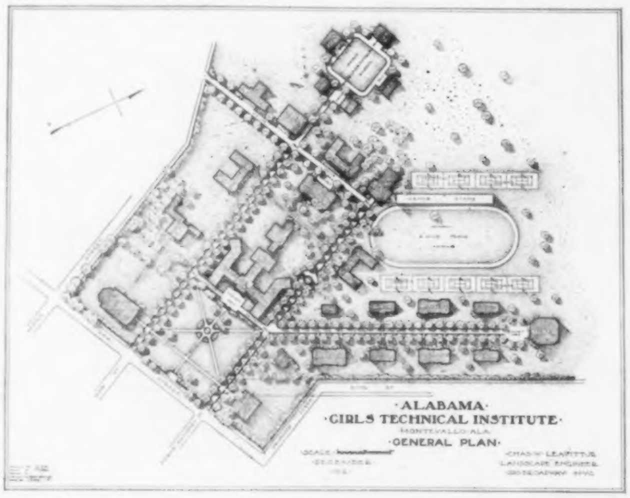
George's blends an English naïveté with the graceful dignity of the lesser Italian gardens. One might fancy it embodied the inspiration that an imaginary architect of Wren's time might have brought back with him from Italy. The Tome is a group of wide spaces, of openness; St. George's charm would be impaired were the buildings separated from each other. It is an example of the "Range," that English type of composition which was perhaps first suggested by the irregular Gothic courtyard shorn of its entrance side, as at Sutton Place in Surrey, or part destroyed, part rebuilt South Wingfield in Derbyshire.

Hoosac School is an example of it among the lesser schools; in Institutional groups it seems seldom to have been used; for Ecclesiastic groups, as at the Intercession in New York, it has apparently come to stay. It easily adapts itself to the close connection under cover desired by most small schools, but on the other hand this can just as well be obtained in the formal plan, as by the curved colonnades of Morristown. The older Hotchkiss School ingeniously places its buildings alternately along a wide corridor and so arrives at a compact connection recalling the arrangement of the shops at the Carnegie Technical Schools of Pittsburgh. The dormitories of the Hoosac School are in a second floor; all other rooms are below, the refectory, chapel, and gymnasium extending through both stories. The refectory divides the boys' from the masters' portions and is arranged like an English hall, with entrance and screen at one end and dais for the masters at the other. The gymnasium, being for the boys, terminates their portion; the chapel, for both school and visitors, naturally is next the entrance and administration. Most small schools seem to prefer the dormitories or chambers in the upper floors, as in the Hoosac, the Ely and the Dow Schools for girls, the Hotchkiss, Taft, and Morristown; the larger schools have separate dormitory buildings, as at St. George's, St. Paul's, the Tome and the Exeter Schools. The analysis of the various groups shows that the administration is generally in the central and most important building, seldom displaced by a Social Hall as at Peabody College, or a library as at Columbia University; that school rooms are generally close to the administration,



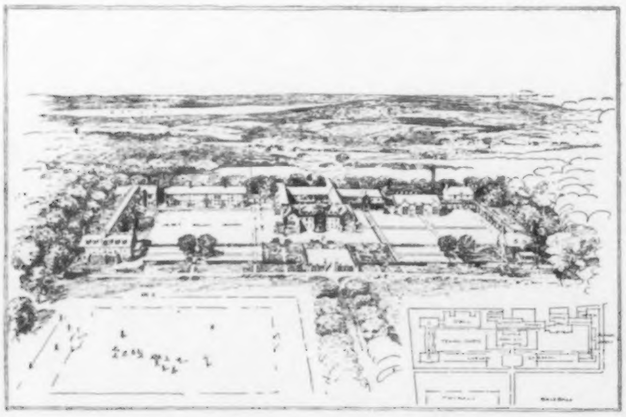
HOOSAC SCHOOL, HOOSAC, N. Y.
Cram, Goodhue & Ferguson, Architects.

Typical modern "Range"; the Semi-Monastic, Semi-English-Collegiate ideal adapted to an American school; the "Hall" central, used as a Commons by masters and pupils and arranged exactly as in the traditional model.



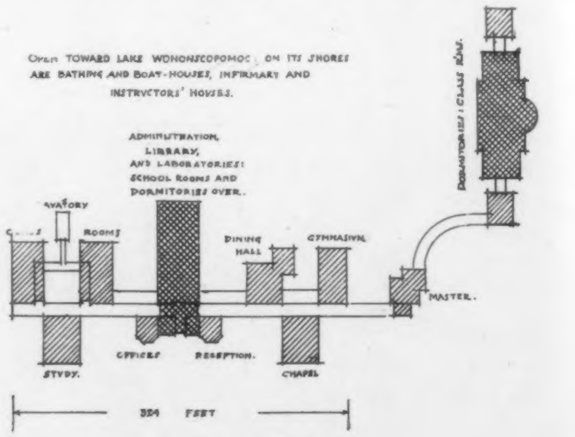
ALABAMA GIRLS' TECHNICAL INSTITUTE, MONTEVALLO, ALA.
Chas. W. Leavitt, Landscape Engineer.

Central School-building, with Auditorium and unassigned building in front; Chapel to the left; special schools to the right, ending in Library; Commons, Dormitories, and Service behind; Farm-School group in extreme rear. Interesting connection of diagonal axis; several existing buildings incorporated in the plan.



ST. GEORGE'S SCHOOL, NEWPORT, R. I.
Architect unannounced.

Marginal Ranges of buildings giving the greatest possible area for open playing fields and turf; unusual arrangement; completely different from typical plan, as at State Normal School, Troy, Ala.



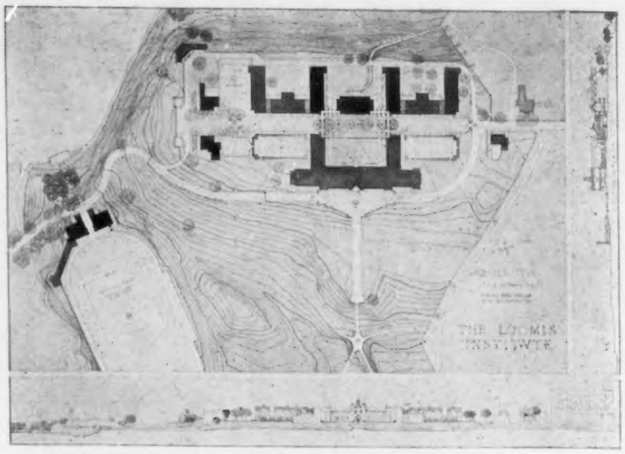
HOTCHKISS SCHOOL.

A closely connected compact type with buildings jutting from a central wide corridor; rarely used; compare Palmer and Hornbostle's shops of Carnegie Technical Schools, Pittsburgh, Pa.

though not at Hoosac or Hotchkiss; that the refectory may be near the dormitories, or widely separated as at St. George's, where its position is governed by the infirmary, which required the same service and yet was to be as far as possible from the dormitories. In the Dow School there is no attempt to separate the infirmary, while the principal's house is distant; in the Hoosac School this arrangement is exactly reversed. The central group of the Morristown has administration and dormitories in the central building, while the refectory is to the left and the class rooms to the right in separate buildings, the three linked together by curved colonnades in the academic manner.

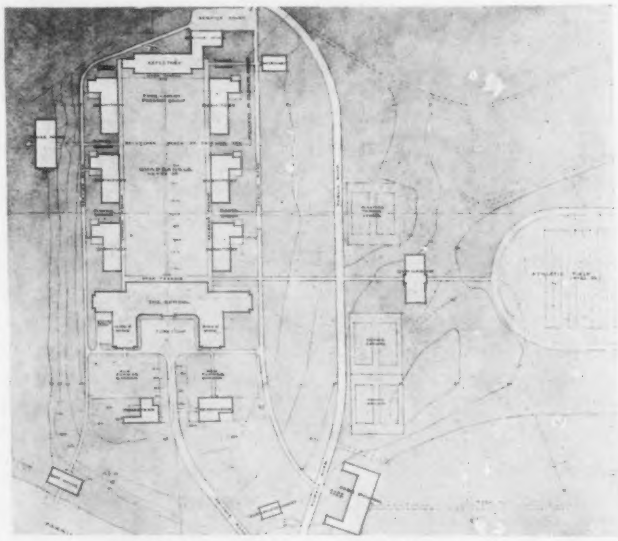
A comparison of each school with the Analytical Table is interesting; there is great diversity in functional arrangement, for each head master has his own particular views. It is therefore evident that an architectural competition for a school must be most uncertain. Apparently this explains the recent reversal of the Loomis Institute award, the professional adviser preferring one arrangement, the head master another. The site is a bleak, windswept hilltop overlooking the Farmington River to the northeast, with low lying meadows to the south and west. The program called for connection under cover between school, dormitories, and refectory; choice of "partie" was between either a close-knit grouping or a distribution of buildings around a large campus with connecting colonnades. The scale of the plans is quite different, a series of small open quadrangles as opposed to one great enclosure.

In several of the schools, as at St. Paul's, Concord, there is a division of the Residence group into several classes according to age; sometimes each has its own school rooms. Such, however, is more typical of the institutions. The Perkins Institute for the Blind has its instructional portion between two dormitory groups, boys to the right and girls to the left, each in ranges of buildings around a long close, suggesting the arrangement of a medieval English monastery like the Vicar's Close at Wells. The smaller children have a quadrangle of their own. The central chapel tower dominates them all; unfortunate that the children can never see it nor be influenced by the delicious



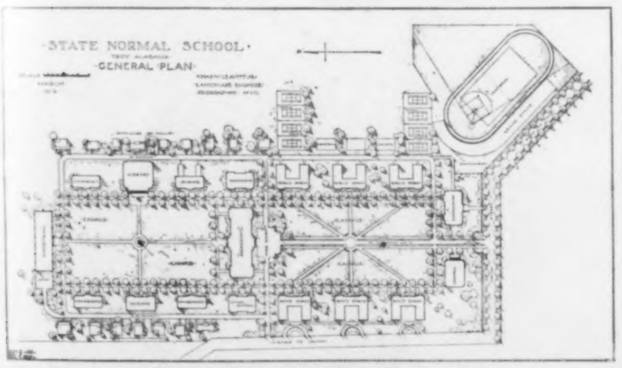
COMPETITIVE PLAN, LOOMIS INSTITUTE, WINDSOR, CONN.
Design placed first by Professional Adviser.
Charles C. Haight and Githens, Architects.

A compact type of small quadrangles open to southeast; shortest possible communication between Dormitories, School, and Refectory; Masters' houses in ends of Dormitories; service by encircling roads, inner quadrangle and green for pedestrians only. Loomis Homestead and old Garden to remain; Power House, Gymnasium, and Field in separate composition.



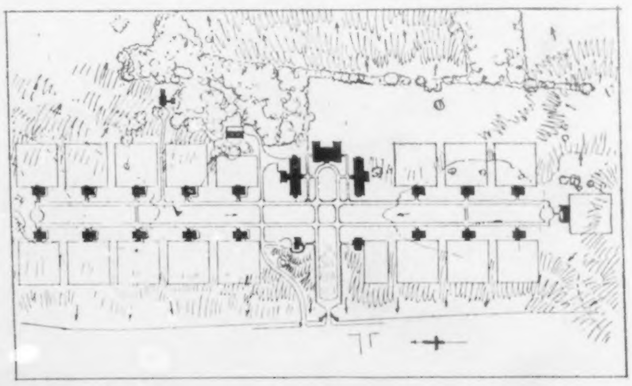
LOOMIS INSTITUTE, WINDSOR, CONN.
Successful competitive plan; Murphy and Dana, Architects.

Site, an exposed hill-top; views to north and southeast; principal approach from north, with required right-of-way through property to other properties to the south. The separate-building type with connecting colonnades around a large court; direct communication from Dormitories to School and Refectory; entrance to court through Schoolhouse; exterior appearance of group subordinated to interior of court, as proved by position of Power House, Infirmary, etc.



STATE NORMAL SCHOOL, TROY, ALA.
Chas. W. Leavitt, Landscape Engineer.

Unusual relation of the three divisions, Scholastic, Residential, and Athletic, as entrance court is used for Dormitories, and school court is behind, with Academic-Administrative building common to both; arrangement selected because there is more communication with town (lying to the southeast) from Dormitories than from school. Typical American plan in every way, with all advantages and defects of the style.



JEWISH PROTECTORY AND AID SOCIETY, HAWTHORNE, N. Y.
Harry Allen Jacobs and Max G. Heidelberg, Architects.

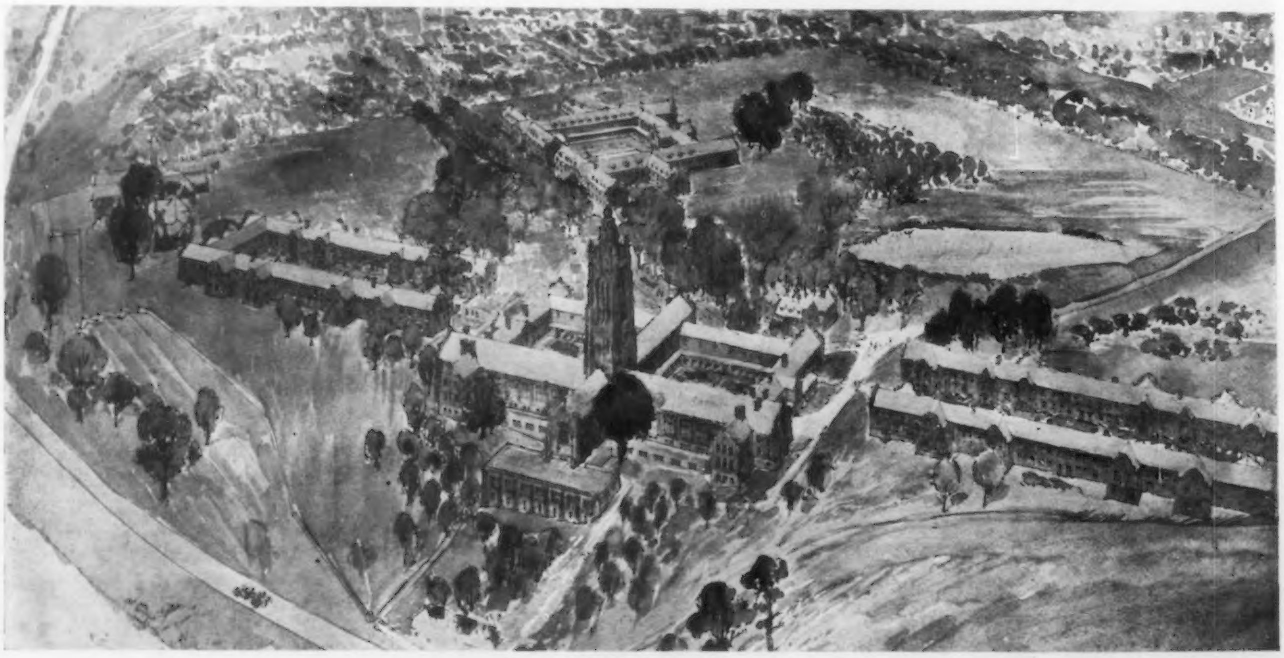
On a long hill-crest in open country; Central Administrative-Scholastic-Social group with separate cottage-dormitories each with its garden, bordering a "Village Green."

semi-Georgian, semi-Medieval architecture. Difficulties in the way of existing roads bordered the greater part of their length by fine trees, the orchards of pears and apples, the formation of the land as it slopes towards the south to the Charles River,—these have all been used to such good account that the group has gained thereby. In its architecture it vindicates the desirability of the "Range."

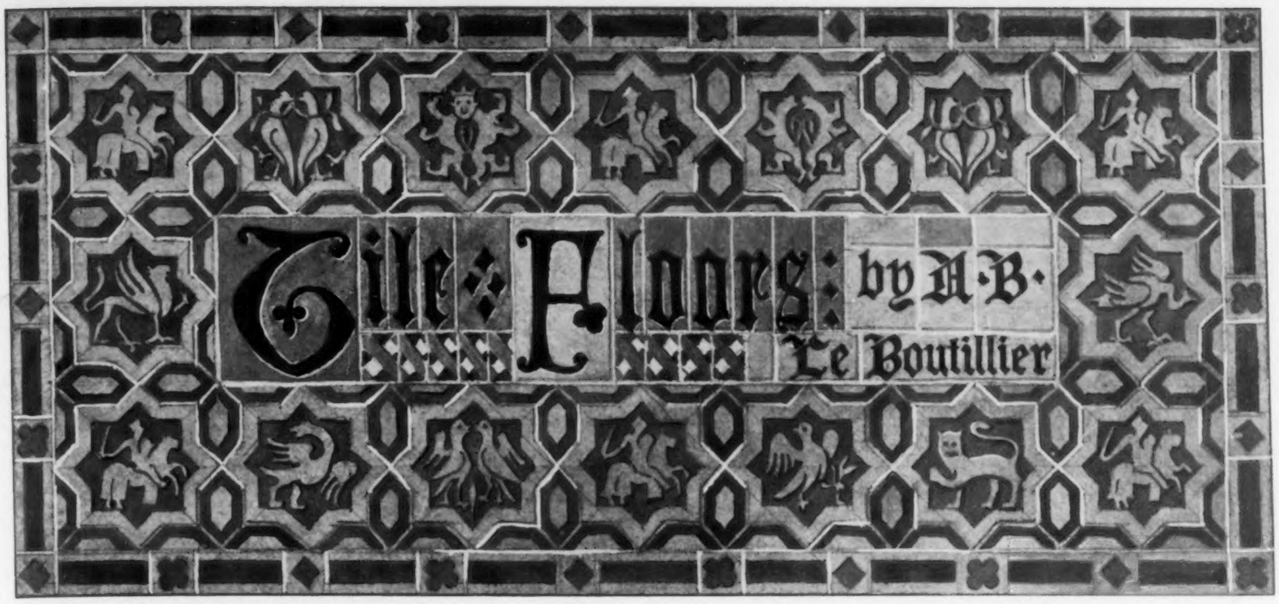
On the opposite principle is the Jewish Protectory at Hawthorne. This is the cottage scheme, and a modern ideal Beaux Arts plan, perfectly composed with the functional divisions clearly marked—administration, refectory and school in the center and the separate cottage dormitories, each with its playground, right and left, down each side of the "Village Green." The widely-spaced cottages are free from the ragged, crowded appearance of the average institutional plan of the separate-building type. The group stretches along the straight ridge of a hill of such even contour that the regularity of plan is appropriate; but unfortunately in other examples the symmetrical plan seems to occur over and over again where the contours least warrant it, or opposed to great irregular hills with the same effect of petty silliness that some of the modern watering-places show at the foothills of the Alps. The plans look so well on a sheet of paper that the Boards of Governors or Trustees, or whoever they be, enthusiastically adopt them. Every one knows what a fiasco the gridiron plan of San Francisco has proved; simplicity on paper, but in reality with many of the paved streets so steep that there is no attempt to drive thereon. Perhaps in the future we shall see the winding road adopted, as the Germans have recently developed it in several of their smaller towns. It has been impossible to show grades on the illustrations here, though they are so vitally important; or to show the relative height of the various buildings to each other or to the spaces between them. Buildings may look far apart on plan and crowded in reality; one of the large courts or quadrangles now so much in favor may look bare and straggling, because the marginal buildings are too low. The relationship a plan shows may not be at all evident in reality. As some one suggested, if Manhattan Island were bordered by rows of buildings, they might be ever so well balanced on plan and each sufficiently wide as to count on paper as proportional to the space between them, but in reality they would not form a group. Perhaps there is some absolute ratio of height of buildings to space between them that must not be overstepped. One who is trained in plans can only see a group as a plan, and, after all, a plan is only a decorative arrangement in black and white on a sheet of paper.

PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND, BOSTON, MASS.
R. Clipston Sturgis, Architect.

Utilization of old roads with bordering trees, and old orchards; segregation of ages and sexes; compact schools and administration with central tower as an effective Dominant to the entire group.



PERSPECTIVE.
PERKINS INSTITUTION AND MASSACHUSETTS SCHOOL FOR THE BLIND.
R. Clipston Sturgis, Architect.



TILE floors have a practical value; they also have great decorative value, and it is with the latter that we are at present concerned.

Owing to the peculiar limitations of the material and the method of manufacture, tiles are necessarily small units. To cover a large surface with these units, obviously requires numerous joints. Therefore, the joints, as well as the tiles, should be given importance in the design. From a designer's point of view, the limitations of a material are its greatest asset, each material requiring its own peculiar treatment.

Not many years ago, all the tiles that were available for floors were of the machine-made variety, so perfect in workmanship that they could be laid in a floor with joints of a hair's breadth. These tiles were made in a variety of shapes and colors, but it was useless to lay out a pattern in one color, because the pattern of the joints could not be discovered without close inspection. If pattern was to count, it was necessary to use color, and the effect was generally hard, dry, and uninteresting. Conditions have since changed, and we have come to realize the value of the joints. It is seldom necessary to lay a floor of plain tiles with joints less than one-quarter of an inch in width. Whether these joints are left the natural color of cement, or are colored, they will always count in the design, and the slight unevenness of the tiles themselves will give a texture that is not as hard and uninteresting as the floors of mechanical perfection.

The character of the building and the location of furniture and rugs affect the design of the floor. If the floor is in an important room of a monumental building and is free from large pieces of furniture, it may well be treated so as to be in accord with the architectural treatment of the walls, but if there is to be much furniture and many rugs on the floor, it is better treated as a whole. This is a point that is often lost sight of in railway waiting rooms and restaurants.

Church floors afford as great an opportunity for tile work as the windows do for stained glass. Much could be said on this subject alone, but it is sufficient here to make the following observation: The nave aisles should be simple, the choir somewhat more elaborate, and the sanctuary very rich in pattern, symbols, and color. In short, the elaboration increases as the altar is approached.

It is not necessary to use large tiles in a large room to get scale, as the tiles can be arranged so that the unit is composed of several small tiles and the scale of the pattern increased or reduced at will.

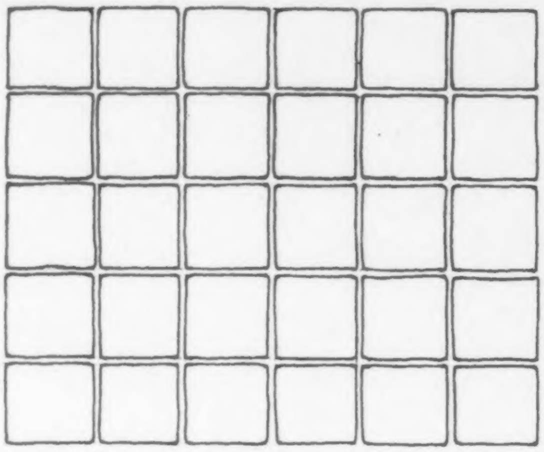
It is not essential that all the tiles laid in a floor come from one factory. Herein has the tile setter great advantage, especially in colored tiles. In the matter of shapes and designs, clay is so easily moulded that there is almost no limit to the variety that the smallest factory can produce. It is in the matter of glazes and quality that manufacturers differ.

There are many patterns that have been common property ever since the beginning of tile making, and are to be found, with slight variations, in many tile manufacturers' lists. New designs can be readily produced and old ones revived; the process is simply a model in clay or wax, from which a plaster mould is made, then the clay pressed in by hand, removed from the mould, dried and baked; a simple primitive process, to which tiles owe much of their charm. The difficulties are in the composition of the clay and glazes; these, of course, it is assumed have been overcome by the manufacturer.

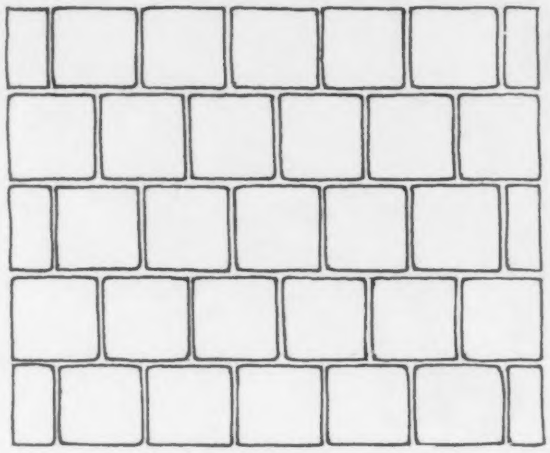
The ideal method of designing a floor is to arrange a general scheme and then lay out the details on the job, changing and rearranging details as occasion arises. This, of course, requires an artist as a workman — and there are such — or constant supervision. This is not always possible, but when it is done, the result is spontaneous and free from the mechanical look that might come from a hard and fast plan laid out on the drawing board.

By the use of color in pattern, and pattern in individual tiles, there is almost no limit to the richness and elaboration possible for tile floors, but on the other hand, it is also possible to make an interesting floor of plain tiles in one color by taking advantage of the joints.

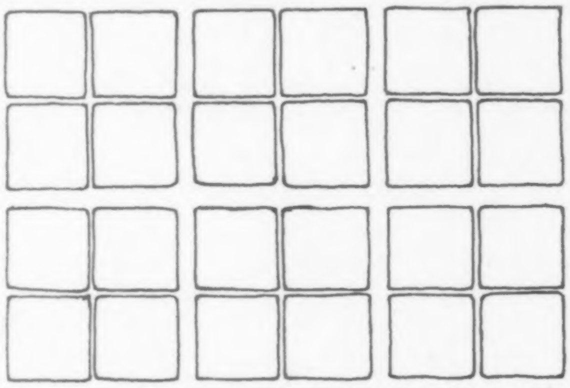
The following diagrams will serve as reminders that the joints are of equal importance with the tiles.



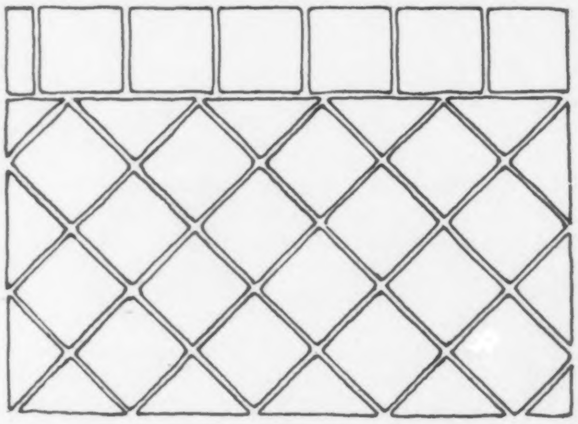
The simplest floor of square tiles is interesting if the joints are in scale.



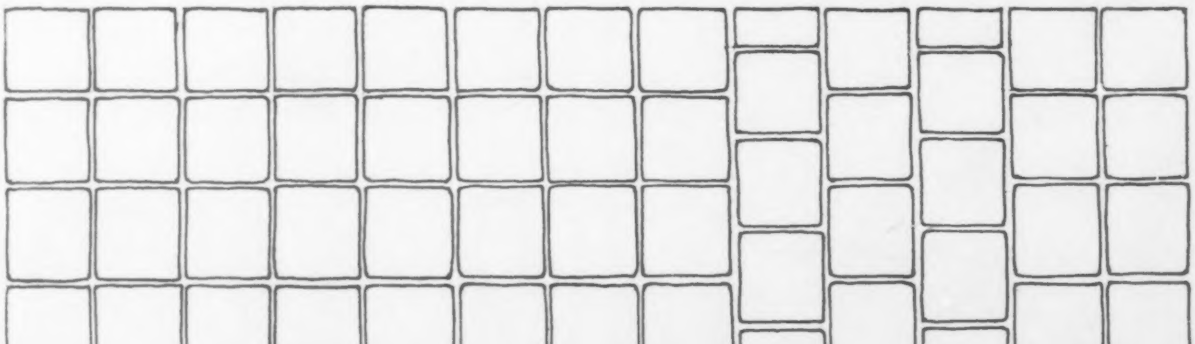
When square tiles are laid with broken joints, long lines in one direction are the result.



By groups of four squares as a unit separated by wider joints, the scale is increased.



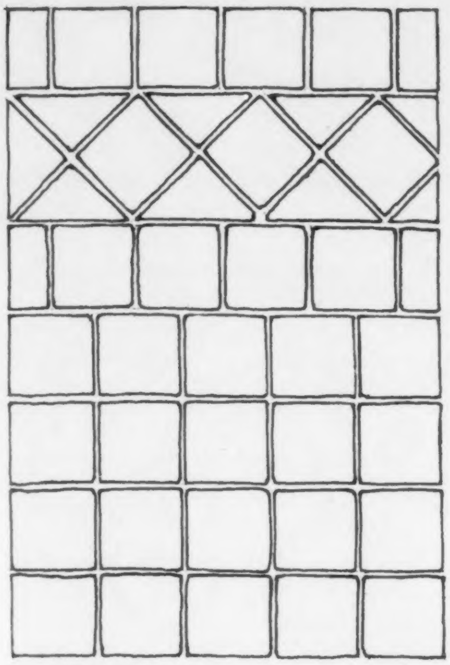
A diagonal pattern of square tiles is emphasized by a border.



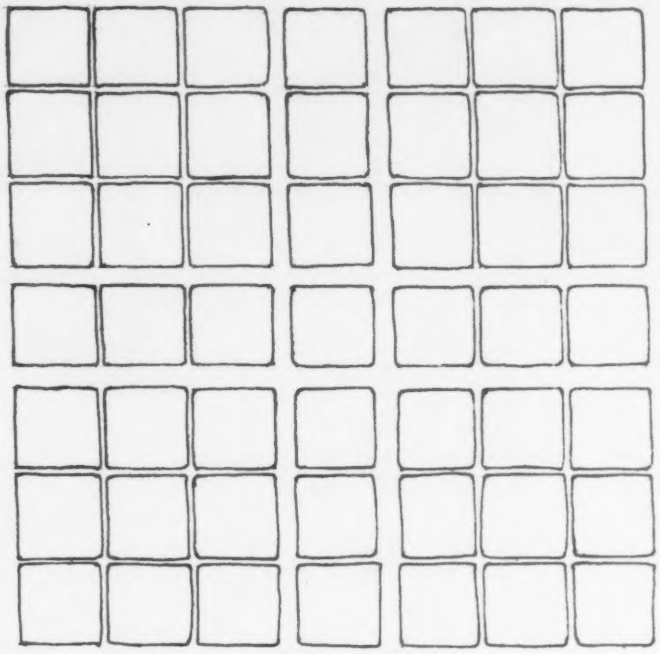
By a few rows of broken joints, an effect of border is produced in a field of square tiles.

DIAGRAMS—TILE FLOORS.

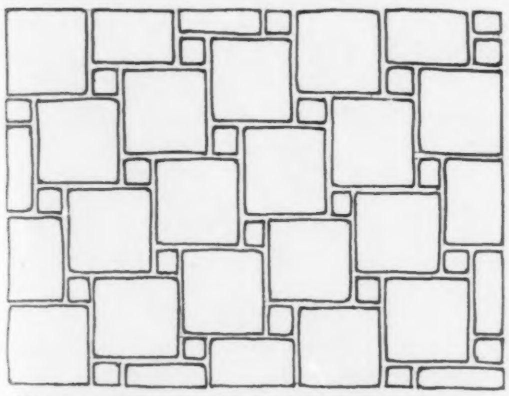
A. B. LE BOUTILLIER, DEL.



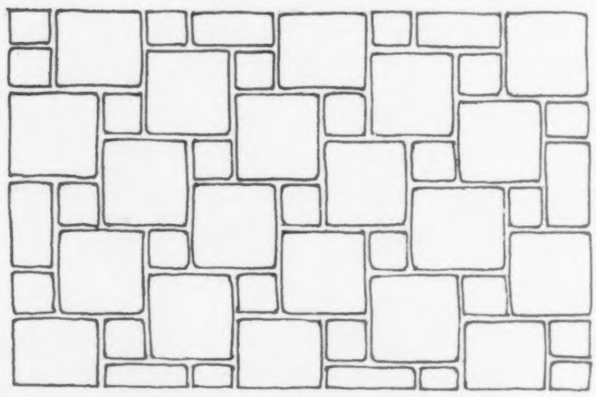
By breaking joints in one course, the border is made wide.



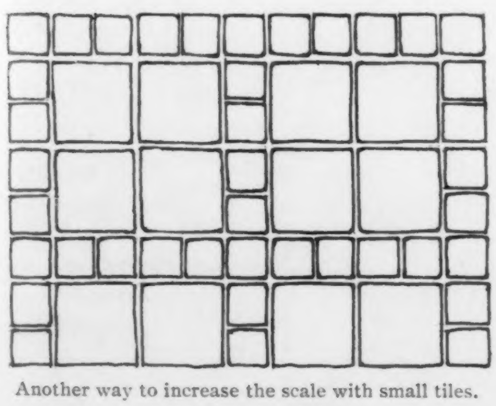
An arrangement adapted to large rooms.



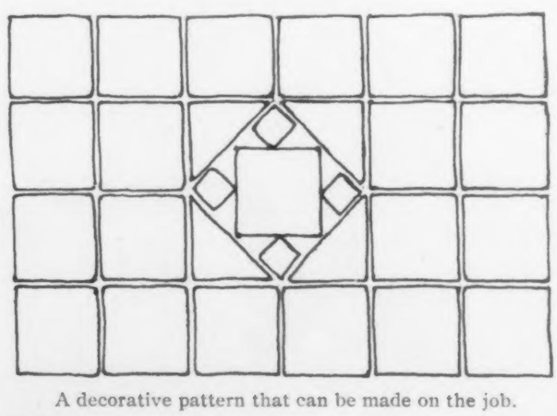
When the small squares are less than one-quarter of the area of the large squares, the pattern runs off at the side.



When the small squares are one-quarter of the area of the large squares, the pattern has more repose.



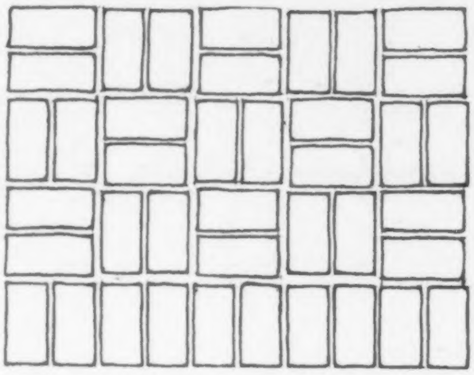
Another way to increase the scale with small tiles.



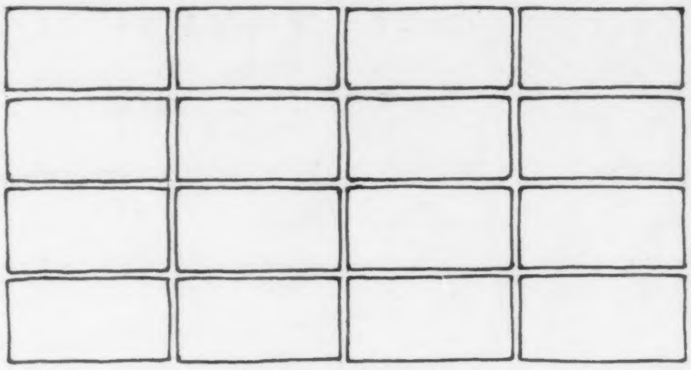
A decorative pattern that can be made on the job.

DIAGRAMS—TILE FLOORS.

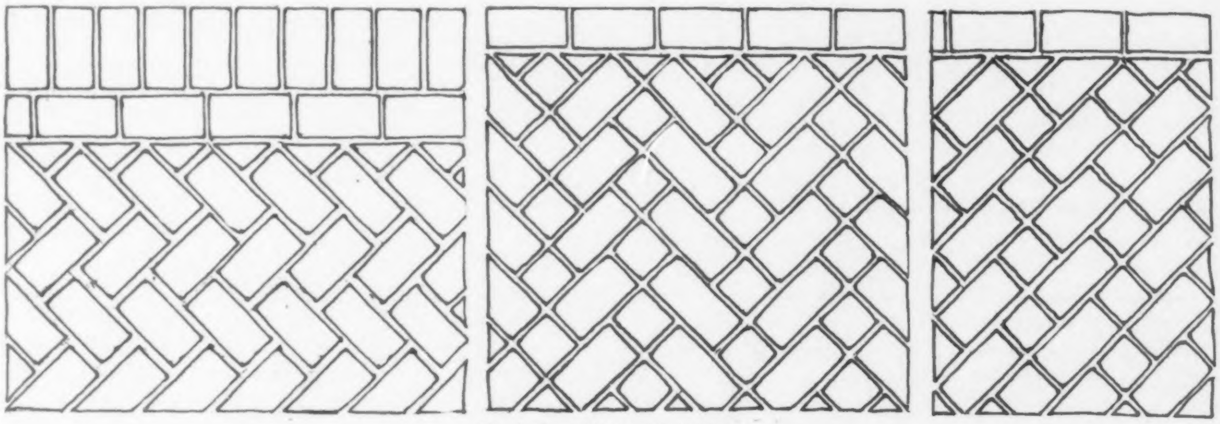
A. B. LE BOUTILLIER, DEL.



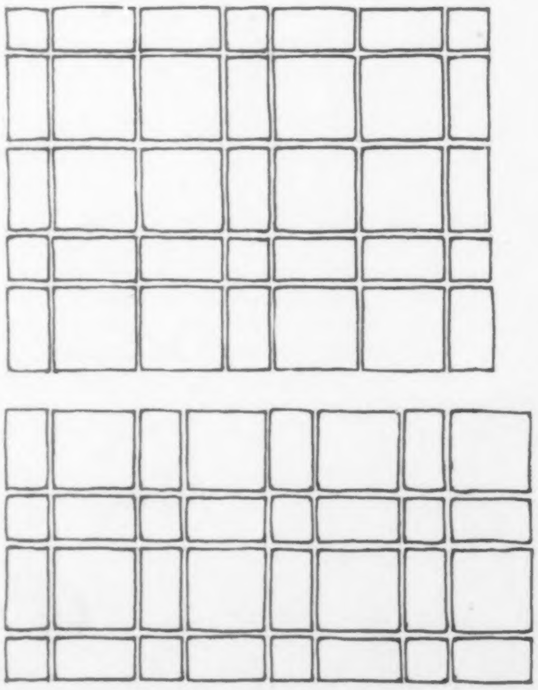
When double squares are laid "basket pattern," the necessary allowance for joints adds interest.



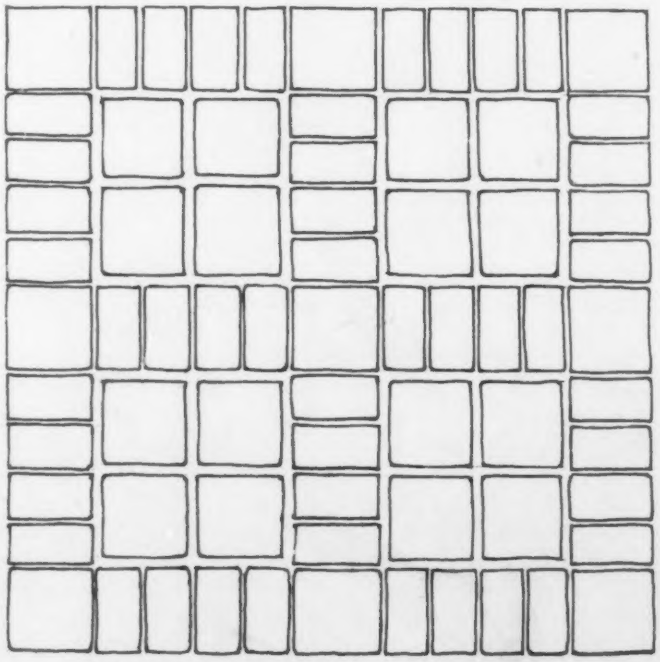
A good pattern for corridors.



Varieties of "herringbone."



Two combinations suggesting plaids.



A simple device for a panel or a floor for a large room.

DIAGRAMS—TILE FLOORS.

A. B. LE BOUTILLIER, DEL.

EDITORIAL COMMENT AND NOTES FOR THE MONTH

ARCHITECTS' FEES

LAST month we discussed two new methods by which architectural fees might be computed. We shall now discuss the advantages of these methods, and then point out their defects.

First let us consider the method of charging the client double the salaries of the draftsmen employed on his work plus a fixed sum for professional services. A client comes to an architect to discuss a building operation. Given the type of structure the architect should be able to approximate the cost of the completed building even if the client has no preconceived ideas other than the amount he wishes to invest. As stated in the January number, those who have experimented with the new systems of charging claim them to be based on the six per cent commission basis. The architect therefore calculates the amount of his commission on this basis. If it were a one hundred thousand dollar building the commission would be six thousand dollars. It is reasonable to suppose that if the work went ahead without hitch the architect would make a net profit of one-half of this commission, because if we analyze his expenses we find them somewhat as follows: Experience and bookkeeping have shown that draftsmen's services and overhead expenses (office rent, stenography, clerical work, supplies, blue-printing, etc.) run about even when prorated to individual jobs. If the progress of the work were smooth, it is reasonable to suppose that the drafting work on the average one hundred thousand dollar building would take three thirty dollar a week men about three to four months' time to complete. In other words, the actual drafting expenses on the work would be in the neighborhood of fifteen hundred dollars. If the building were a factory, mill construction, this expense might be reduced; if it were a private house, it might be increased. Now as the general overhead expenses can be rated as approximately equal to the drafting expenses, we find that three thousand dollars will practically cover the cost incurred if the work is carried out under ideal conditions for the architect, that is, if he has full sway to carry on his work from start to finish without innumerable unforeseen delays, making the job drag on for two or three years, and so eat up his profits. But an architect's work is very seldom carried on under such ideal conditions, and to average a profit of one-half of the gross commissions, although it may be done now and then, is not usual if the work is carried on conscientiously, and especially if the work is small. The architect therefore goes over the situation with his client and finally makes him the proposition that he, the architect, receive three thousand dollars for professional compensation, and that the client pay him double his draftsmen's salaries. By such an arrangement the architect makes sure of his profit in the beginning, and except from the standpoint of personal inconvenience he does not care how long the client procrastinates in his building operations.

The situation for the client also has its distinct advantages; he is certain that the architect is disinterested in the total cost of his structure. The client is simply paying a fixed sum for the architect's professional services, and the actual cost of producing the drawings and specifications. He is practically hiring the architect to run an office for him.

Now, let us see just where the client stands, and in order to do this let us take a concrete example with which to demonstrate. An architect is designing a bank. In this bank is a large and lofty banking-room. The architect tells his client that he can make it a beautiful room in two ways. He suggests either paneling the walls with costly marbles or carefully and elaborately decorating the room, treating the surfaces in plaster of Paris. The former treatment depends largely on the material for its beauty, the latter on the complexity and refinement of its detail. It is possible that the cost of these two treatments might be identical. If the architect were working on the six per cent commission basis, it is possible that the elaborate decorative plaster drawings that he would have to produce would completely annihilate his profit, whereas marble paneling could be drawn up and carefully specified, with but little expense. But the architect is working for a definite sum, the client has paid him for his professional services, and if the decorative plaster treatment is decided upon, the burden of the cost of producing the drawings for it rests where it should, on the man for whom the draftsmen are working — the client.

What then are the defects of this system from the architect's point of view? How can he lose? He can lose considerable profit in the case possibly of a factory or mill in which the drafting, and consequently the overhead expenses, would in no way approach fifty per cent of a total six per cent commission. But letting alone the question as to whether or not it is just that the architect should receive a profit out of proportion to the work he does, what he loses on the mill job he makes up with the guarantee of an assured, just, and reasonable profit on the house, bank, church, etc. It would seem then that the system was of benefit to the architect.

What then are the client's arguments against it? It is reasonable to suppose that his first question would be, "How am I to know how many and how expensive draftsmen it is warrantable for my architect to employ on my work?" If it is entirely at the discretion of the architect as to how many and how expensive draftsmen he may employ on the client's work, doesn't the system of paying double the draftsmen's salaries set a premium on inefficiency on the part of the architect?

We have already stated that experience shows that overhead expenses can be calculated as equal to the drafting expenses. This is true if the work is efficiently and conscientiously carried out by the architect, but if the archi-

tect were to employ a man receiving forty dollars a week to do the work of a man receiving ten dollars a week, the overhead expense column would not tally with the extravagant pay-roll. The client sees then that if he is paying double the draftsmen's salaries, he must have implicit confidence in the conscientiousness and practicality of his architect.

It would seem, therefore, that by "the professional bonus, plus twice the draftsmen's salary" basis, the architect could lose nothing but that the client might lose considerable through inefficiency in drafting-room management. The other alternative system suggested, that of charging four times the draftsmen's salaries, simply increases this difficulty, the importance of which we will discuss more fully in our March number.

PRIZE WINNERS — THE BRICKBUILDER'S ANNUAL ARCHITECTURAL TERRA COTTA COMPETITION.

THE Jury of Award for the Public Garage, Automobile Sales and Service Building Competition awarded First Prize, $500, to John S. Sheridan, New York City; Second Prize, $250, to Valere de Mari, Chicago, Ill; Third Prize, $150, to Ralph Herman Hannaford, Boston, Mass; Fourth Prize, $100, to Arthur O'Neil Geddes, New York City. Mentions: Sampson J. Fountain, College Station, Texas; Claud W. Beelman, Toledo, Ohio; Frederick Scholer, Chicago, Ill; H. P. Beers, Chicago, Ill.; F. N. Roberts and S. Nesselroth, Boston, Mass.; G. Evans Mitchell and Wm. F. Burkhart, Jr., New York City.

The competition was judged in Boston, January 25th, by Prof. Jas. Knox Taylor of the Massachusetts Institute of Technology, Burt L. Fenner of the firm of McKim, Mead & White, D. Everett Waid, Walter H. Kilham (Kilham & Hopkins), J. Lovell Little, Jr., and F. L. W. Richardson (Richardson, Barott & Richardson).

PLATE DESCRIPTION.

HOSPITAL FOR THE RELIEF OF THE RUPTURED AND CRIPPLED, NEW YORK CITY. PLATES 21, 22, and 23. — The building is designed in the Renaissance style of northern Italy. The wall surfaces and the shafts of the octagonal columns are constructed of a buff wire cut brick laid in Flemish bond. The secondary cornice band courses, capitals, etc., are of ornamental terra cotta of a color toning in with the brickwork. The main cornice is of copper. As the building site is in the middle of a block, extending through from street to street, it was important to have large courts for light in the upper stories and wide areas for sufficient light and ventilation in the basement. The body of the building was therefore placed across the lot in front of its center, with two wings on the north and two on the south. The building is of the most modern type of fireproof construction. The two main staircases, located in the east and west ends of the main building, are entirely enclosed and separated from the corridors by fireproof doors. The floor plans show in detail the departments on each floor. The sixth floor is planned with a flat roof for outdoor treatment and recreation. The solarium divides this into two sections, one for the boys and the other for the girls. A large part of each section is roofed over so that patients may be out, even in the most stormy weather. As the view in all directions is most attractive, the masonry parapet is kept low and a wire mesh screen built above it for protection.

FIRST CHURCH OF CHRIST, SCIENTIST, WASHINGTON, D. C. PLATES 26, 27. — This new building is of fireproof construction, the floors of reinforced concrete and partitions of brick or terra cotta blocks. The materials for the exterior are Ohio gray-canyon sandstone for entrance portico and base, in combination with gray terra cotta and 3 by 12 inch gray facing bricks, of a rough texture, laid in Flemish bond with wide recessed joints. The roofs are covered with Greek pattern unglazed tiles in a soft shade of green. The three main entrance doors are of bronze. The staircases are of gray Tennessee marble with wrought iron balustrades. The woodwork of interior, including pewing and platform railings and desk, is Mexican mahogany, and the floors of auditorium and Sunday school room are of quartered white oak in parquetry patterns. The floors and wall bases of foyers are of gray Tennessee marble, and the floors of entrance portico and terrace are of 13 by 12 inch red Welsh quarry tiles.

The building contains 538,500 cubic feet, measured from the lowest floor lines, and the entire cost, exclusive of organ, was $140,000, or at a rate of twenty-six cents per cubic foot.

EASTHAMPTON PUBLIC LIBRARY, EASTHAMPTON, L. I. PLATES 28, 29. — The donor of the library, remembering the fact that Easthampton was settled by people from Maidstone, England, desired to construct a building which would recall the architecture of the Maidstone Library, which was formerly an English Manor House. Certain details of the Easthampton Public Library were copied pretty closely from the old, especially the fireplaces and certain pieces of furniture and the andirons. The front of the building, divided by removable screens into three parts, is arranged to open into one for lectures and entertainments. As the library is used largely in the summer, a garden and fountain were made a feature of the design at the rear, enclosed by trellises. The peculiar shape of the plan is due to the fact that the lot lines ran at quite an acute angle with the street front. The furniture, the lighting fixtures and decorations, even to rugs, were purchased for the owners by the architect, and a considerable part of the furniture was designed and built especially for its present location.

THIS month we are illustrating the Church of Kato Panhagia, Arta, Epirus, Greece.

These churches, like those of the new period elsewhere, are almost invariably very small, rarely exceeding 30 feet in their greatest dimension. On the other hand, they were built in incredible numbers, frequently with considerable richness and delicacy of execution. Their size is perhaps to be ascribed to the practice of having but a single altar in each, in contrast with the Western custom which assembled many minor shrines as chapels of a single great building.

WE acknowledge, with regrets, that the name of the architectural firm, George S. Orth and Bros., Pittsburgh, Pa., the architects of the Thaw House, Sewickley, Pa., was inadvertently and not intentionally omitted by both author and publisher in an article pointing out the architectural merits of this particular house. This article appeared in our January, 1913, issue.